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# Practical Carpentry

Being a Complete, Up-to-Date Explanation of Modern Carpentry
and an Encyclopedia on the Modern Methods
Used in the Erection of Buildings, From the
Laying of the Foundation to the
Delivery of the Building
to the Painter

IN TWO VOLUMES

EDITED UNDER THE SUPERVISION OF

**WILLIAM A. RADFORD**

Editor-in-Chief of the "American Carpenter and Builder," President of
"The Radford Architectural Co.," Author of "The Steel Square
and its Uses" and the Best Authority in the Country on
All Things Pertaining to the Building Trade

ASSISTED BY

**ALFRED W. WOODS and WILLIAM REUTHER**

## VOLUME II.

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# PREFACE

In preparing the second volume of the study in carpentry, it has been my endeavor to take up the subject where it was left off in volume one. Special chapters are devoted to shingling, and other methods of covering roofs, mouldings for interior finish, joinery, mitering and dovetailing, lengthening ties, stair building and questions and answers. This last part will be found to be of special interest, as it covers the entire building field in a way that could not be done in a regular article. The first chapter on Building Construction will be found very valuable as the illustrations are all large and easily understood, and the treatment of window construction is the most complete ever published.

I have followed the plan of illustrating every example given, as experience has taught me that an illustration is of more help than twice the amount of description.

William A. Radford,
Chicago, Ill.

## VOL. II

# Practical Carpentry

## Part I

**BUILDING CONSTRUCTION.** Foundations—Materials commonly used in walls of buildings—Bonding stretchers—Lime, cement and mortar—An arch—Brick arches—Foundation construction—Cellar windows—Framing—Joints used in framing—Framing around a fireplace—Girders—The fireplace—Windows in frame walls—Double hung sash windows—Double hung sash frame in a double plastered wall—Storm resisting windows—Inside blinds siding in grooves

The object of a foundation is to form a solid base, arranged to distribute the weight of the superstructure over a large area of ground and so reduce the inevitable "settlement" to a minimum and to provide for a uniform movement in settling, so that the framework will not be strained and the plaster cracked.

We are therefore dwelling briefly upon the subject of foundations, as it should be the duty of every carpenter to become familiar with the construction and principles which govern foundations.

The method of constructing such foundations is largely determined by the nature of the soil and may be classed as follows:

Class I.—Foundations where the soil is firm enough to bear the weight of the building.

Class II.—Foundations on marshy grounds.

In Class I the foundation may be formed—

Firstly, by brick footings formed by spreading the wall by means of off-sets as shown in Figs. 1, 2 and 3.

Secondly, by laying down rough thick stones of width equal to twice the thickness of the wall, and then forming brick off-sets to distribute the weight of the wall on the stones, as in Fig. 4.

Thirdly, by concrete footings composed of Portland cement, broken stones and sand mixed together with water; a good proportion being, one part of cement, two of sand, and four or five of broken stone. The material thus produced becomes a solid mass as hard as stone. This method as shown in Fig. 5, is preferable to the preceding ones and is being generally adopted. The success of it depends upon the proportion of cement, sand and stone, as above given, being strictly adhered to, and care should be taken that the mixing is inspected, as the tendency is to economize on the cement to the detriment of the concrete.

In Class II, a solid bed is formed for the foundation by driving wooden piles into the marshy soil as shown in Fig. 6. Oak, yellow pine, spruce and hemlock are the woods commonly used. The piles are driven through the soft soil to the firm bed beneath. The heads are then cut off at a certain level and a timber capping put on them. This capping is commonly of yellow pine and serves as a

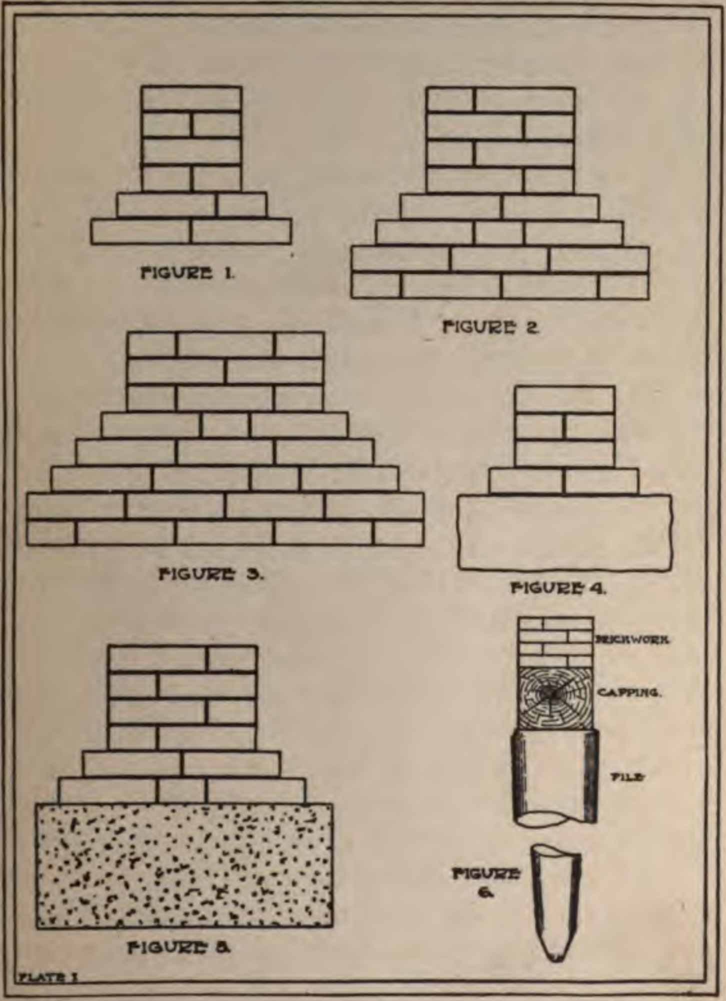


PLATE I

support for the foundation above and at the same time ties the piles together.

It frequently happens that the piles do not reach the firm soil owing to its great depth. In this case the load is wholly supported by the friction of the earth on the sides of the piles; which, however, is generally found ample except in the case of large building and engineering operations.

**The materials commonly used in the walls of buildings** are brick and stone, and within the last few years cement blocks have been used to a great extent and with very satisfactory results. The locality in which the building is being erected and the purposes for which it is intended determine largely the material which is to be used. Thus in a district where stone is easily obtained this material is naturally used; while in places where clay is abundant, bricks are largely employed. Bricks are to be preferred to the stone in that they lend themselves more readily to regular arrangement and to a system of bonding.

**Bonding** is the arrangement of the bricks to overlap each other so that no continuous vertical joints occur either on the face or the inside of the wall. This is necessary as the mortar joints are the weakest part of a wall, and if the vertical joints were made continuous, the wall would tend to give way along these lines.

The thickness of mortar joints varies according to the quality of the brick used. Pressed brick, with edges straight and true, only requires a joint one-eighth of an inch thick; ordinary brick joints at from one-quarter to three-eighths of an inch;

while common brick frequently have as much as five-eighths of an inch at the joint.

**Stretchers** are the bricks laid with their lengths in the direction of the length of the wall. Headers are the brick laid with their lengths across the wall. See Fig. 7.

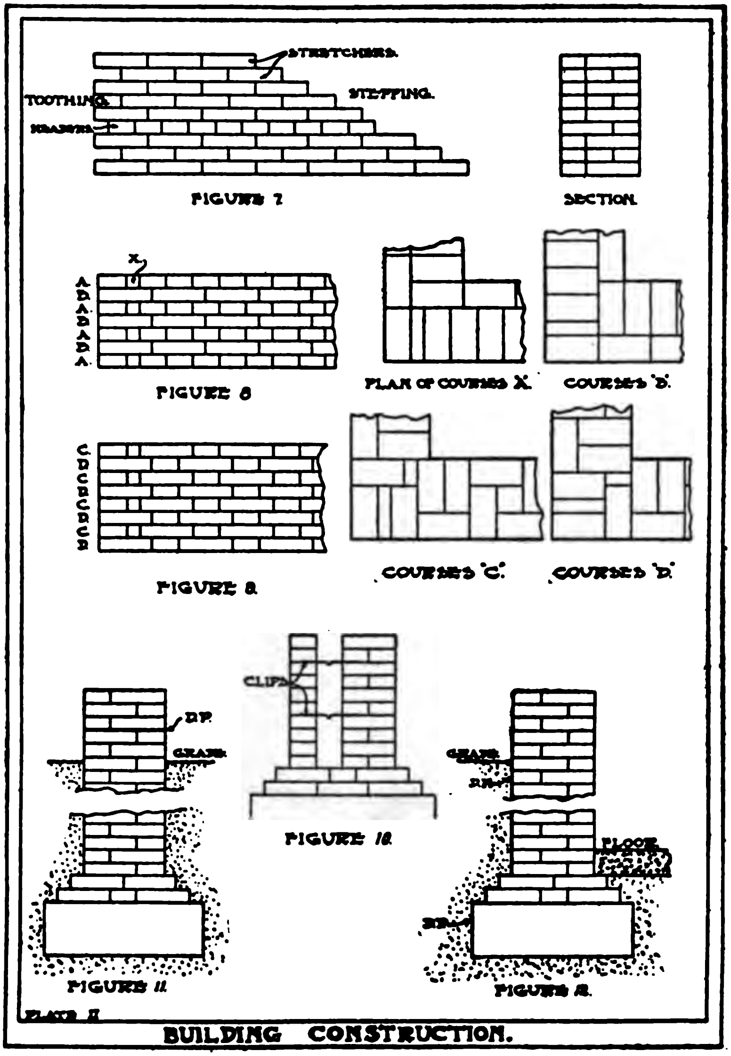
All bricks, to be laid in dry weather, should be wetted before being used, in order to wash off any dust and to prevent too rapid absorption of the moisture of the mortar. Whenever new brickwork is joined to old, the old work should be thoroughly wetted to insure proper adhesion. All foundation brickwork should be started well below the lowest frost line.

In the erection of brickwork, all the walls should rise at about the same rate; no part being carried more than three feet above the rest, or unequal settlement is likely to occur with the result that the wall soon shows signs of fracture. If it is not possible to carry all the walls up simultaneously, the portion first built should be "stepped back" rather than "toothed." See Fig. 7.

Fig. 7 shows the bond commonly used in brickwork, with headers every sixth course.

Fig. 8 shows what is known as English bond. The plans show the method of laying the bricks in the two courses.

Fig. 9 shows the arrangement of bricks to form the Flemish bond. In this and also the English bond, particular care should be taken to keep each vertical joint in any one course directly over the corresponding vertical joint in the course next but one below. A neglect of this precaution detracts considerably from the appearance of the finished work.



BUILDING CONSTRUCTION.

Fig. 10 shows the construction of a hollow wall, which, with the same amount of material, is more stable than a solid wall and possesses many other advantages. It consists of two separate walls, with an airspace of four inches between them, tied together with bonding irons or "clips" every few feet. A wall of this kind prevents dampness from penetrating to the inside.

Fig. 11 shows a damp-proof course, marked D P., which should never be omitted in important work. It consists of a layer of impervious material laid on the walls just above the ground and below the floor beams; its object being to prevent dampness from rising from the ground and getting into the building. Materials suitable for damp-proofing courses are: Asphalt, pitch, slate, damp-resisting paints and cements, or any material that does not allow moisture to pass through it.

In buildings having a cellar below the ground, this damp-proofing material is applied to the outside of the cellar walls from a little above the ground level, well down to the under side of the footing course. See Fig. 12.

## Lime, Cement and Mortar

This is a subject to which considerable space might well be devoted, but, as it is not the purpose of this series to go into the subject so deeply, only such information will be given as may be required in the ordinary erection of cottages and the smaller buildings.

All lime should be freshly burned and thoroughly slacked.

All cement should be finely ground and free from lumps.

All sand should be clean, sharp, free from loam and salt, properly screened and washed.

Lime mortar is usually composed of three parts of sand to one of lime, but two parts of sand to one of lime makes a much better material.

Lime.—Rosendale cement mortar is mixed one part of Rosendale cement, one part of lime and five parts of sand and should be well mixed before the water is added.

Lime.—Portland cement mortar is mixed one part of Portland cement, one part of lime and six parts of sand. All should be well mixed before the water is added.

Rosendale cement mortar is mixed one part of Rosendale cement to two parts of sand.

Portland cement mortar is mixed one part of Portland cement to three of sand, for ordinary use, and for important work one part of Portland cement to two of sand, thoroughly mixed dry, adding only enough water to render mortar of good working consistency.

A little lime should be added to cement mortar to be used in freezing weather. The mortar should not be made up in greater quantities than required for the work on hand, and no excess that may have been left over night should be used in any way.

**An arch** is the arrangement of bricks, stone or other materials to span an opening. They are named from the outline of their soffits, as segmental (Fig. 13), semicircular (Fig. 14), or flat (Fig. 17). The terms of the various parts of the arch are shown in Fig. 21. The soffit or under side

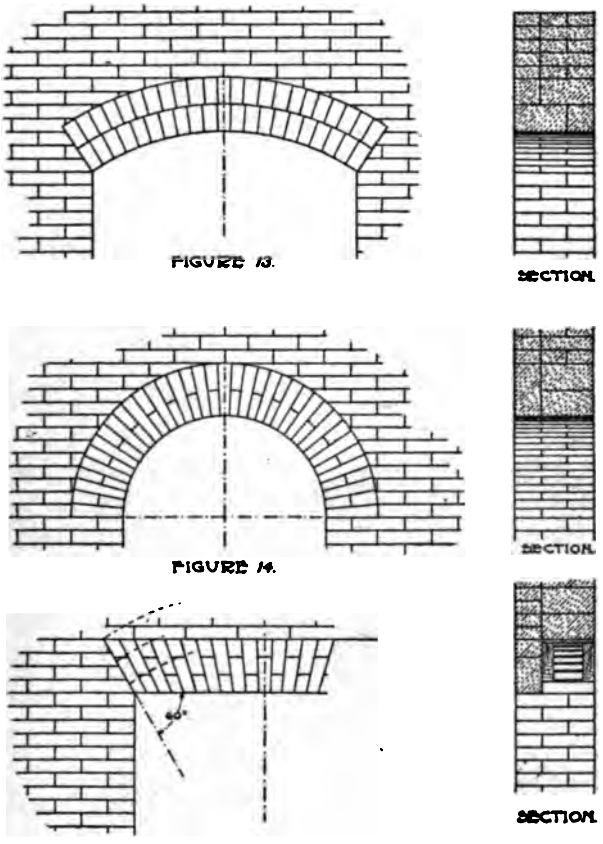


FIGURE 13.

FIGURE 14.

FIGURE 18

PLATE II

BRICK ARCHES.

of the arch is also called the intrados. The back or upper side is also called the extrados. The pieces marked "B" of which the arch is composed are called voussoirs. The skewback is also known as the springing line.

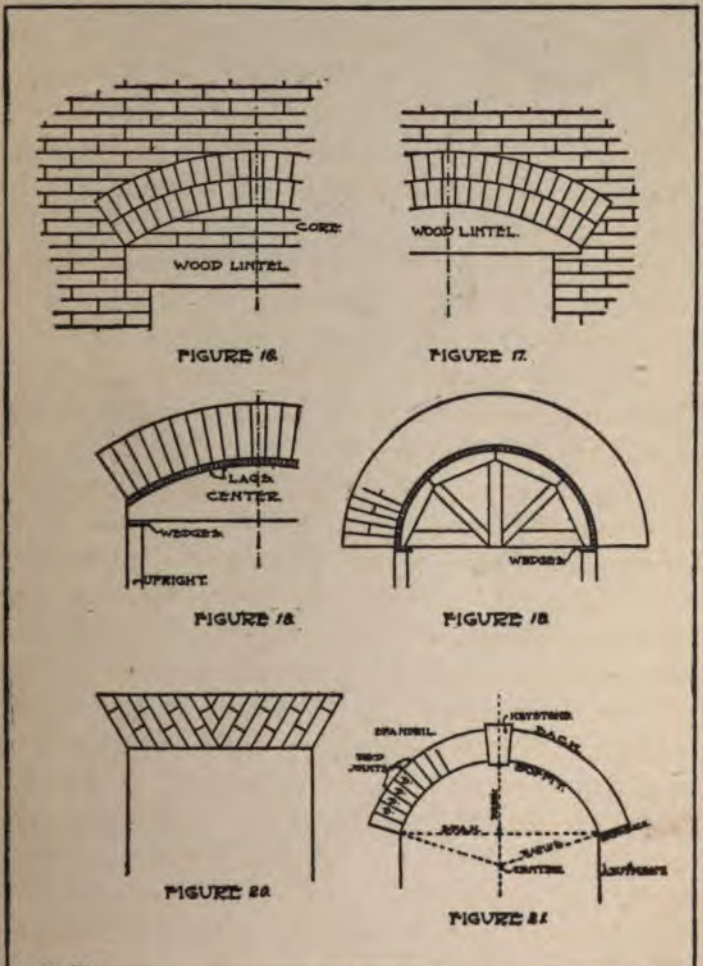
Semicircular and segmental arches are the best as far as strength is concerned and are the simplest to construct. Other forms such as flat, Dutch, elliptical, and three-centered arches are used only where the architectural style of the building makes them preferable.

Fig. 13 shows the two-row-lock arch used in common work. The bricks are laid on edge in two concentric rings extending through the wall.

Fig. 14 shows a segmental arch. Ordinary bricks rubbed or cut to the required shape are used and form a perfect bond.

Fig. 15 shows the flat arch which also requires the use of rubbed or cut bricks. Arches of this form should have a rise or camber equal to about one-eighth of an inch for every foot of span, in order to prevent it from sagging when the arch settles. The skewback is usually made to an angle of 60°. Arches of this kind only appear on the exterior face of the openings; the inner part of the wall being carried on a wooden lintel as shown in Figs. 16 and 17. On top of the lintel is formed a rough brick relieving or discharging arch; the object of which to is prevent collapse in case of the destruction of the wooden lintel by fire or rot. The brickwork on top of the lintel and under the relieving arch is called the core (Fig. 16). The construction when this core is omitted is shown in Fig. 17.

Figs. 18 and 19 illustrate the temporary wooden structure required to support the bricks of an



BRICK ARCHES.

arch while the arch is being built. The upper surface of a center corresponds in outline to the soffit of the arch. They consist of two parallel boards cut to the required curvature and covered with narrow wooden strips called "lags" for supporting the bricks. The centers are supported on wooden uprights with wedges as shown. These wedges can be eased when necessary. The centers should never be removed before mortar has properly set.

Fig. 20 illustrates the Dutch arch, which, as it is of weak construction, is suitable only for openings of narrow span.

## Foundation Construction

Stones used for building purposes differ from bricks in being of unequal shape and size; in consequence of which considerable care must be taken in order to obtain a good bond. Bonding, as in brickwork, is the arrangement of the stones to overlap each other so that no continuous vertical joints occur. The unevenness of the stones, except in the case of cut stonework, also necessitates thicker mortar joints than are required in laying up brickwork.

To guard against fracture being caused by settlement, the length of the blocks should not, in the harder class of stones, exceed four or five times, nor the breadth be more than two or three times, the thickness. In the softer kinds of stone the length should not exceed three times, nor the breadth be more than one and one-half times, the thickness.

All stones should be laid on their natural bed; that is, laid on that plane of division along which the stones are spilt when obtained from the quarry. A neglect of this precaution very often causes the stones to split.

Fig. 22 shows a wall with the stones laid up random rubble. Stones of all shapes and sizes are used and for that reason require considerable skill in laying, as their irregular surfaces make them difficult to bed and bond. Proper bonding requires the insertion of through stones (marked T. S.) at intervals of four or five feet in the length of the wall, and about every eighteen inches in the height of the wall. An equally good substitute for a through stone, is a stone extending from the inside of the wall, three-quarters of the thickness of the wall, and overlapping another stone extending from the outside of the wall three-quarters the thickness of the wall. Through stones and three-quarter stones should be of sufficient thickness to prevent fracture through settlement of the wall. Fig. 23 shows a section through the wall.

Fig. 24, at A, shows uncoursed square rubble, and, at B, shows squared rubble built up to courses. Both of these arrangements are superior to random rubble. In both cases the wall is built of rectangular stones with squared ends. In the latter case, the wall is brought to a level every fifteen to eighteen inches.

Fig. 25 shows a wall built up of field stones. This kind of a wall is used principally in the picturesque cottages and country homes.

Fig. 26 shows an elevation and section of coursed ashlar. Ashlar is a facing of stones, never less than four inches thick, used to cover walls of

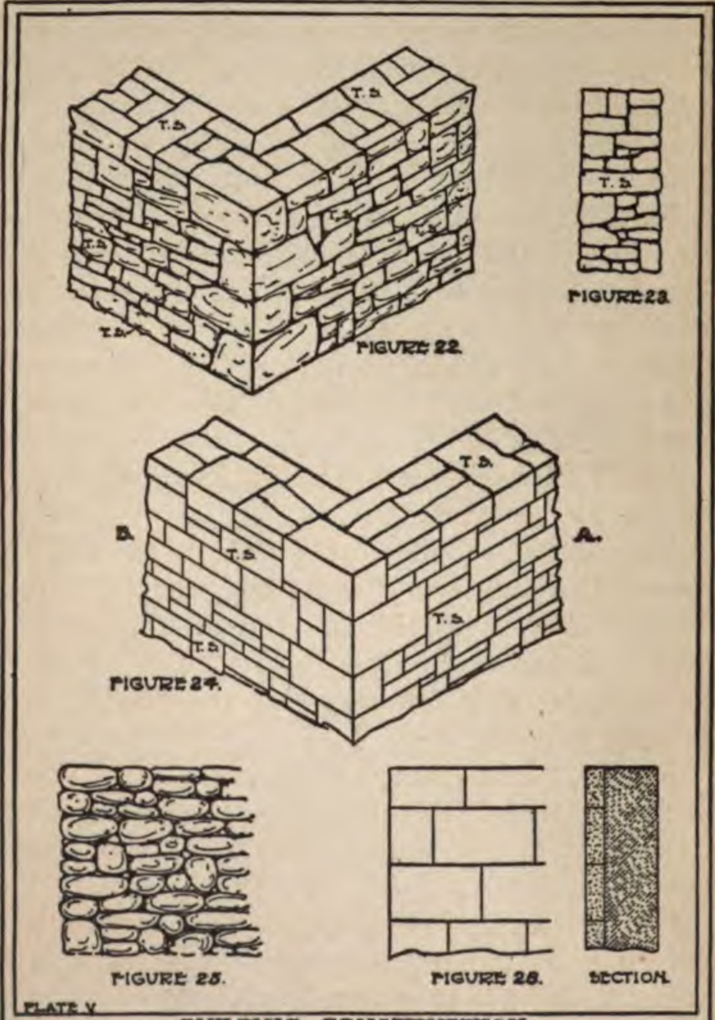


PLATE V

BUILDING CONSTRUCTION.

brick or rough stone, to which it should be securely anchored. Foundation walls, where ashlar is used, should be made of sufficient thickness to carry superstructure, independent of the ashlar unless the ashlar be at least eight inches thick and bonded into the backing, in which case it may be counted as part of the thickness of the wall.

### Cellar Windows

Plate VI takes up the construction of an ordinary cellar window in a stone wall. The sash is hinged at the top with heavy wrought iron butts and arranged to swing in. It is secured in place, when closed, by a catch on bottom rail, and, when open is secured with a hook on cellar ceiling or beams.

Fig. 27 shows the elevation; Fig. 28, the section, and Fig. 29, the plan.

Fig. 30 is a section through the head of the frame. The staff bead is sometimes omitted, but, as it makes a better finish at the junction between wood and masonry, hiding the roughness of the stonework where it takes up with the wood, it is desirable to use it.

Fig. 31 is a section through the jamb. The "lug" is a piece left on the ends of head and sill and built into the wall to secure the frame in place.

Fig. 32 is a section through the sill. Stone sills near grade do not require a drip. The inside of the wall is finished in cement.

Figs. 33 and 34 show the head and sill of a window with an iron guard and a window screen outside of the sash. The iron bars are let into the head and sill about an inch.

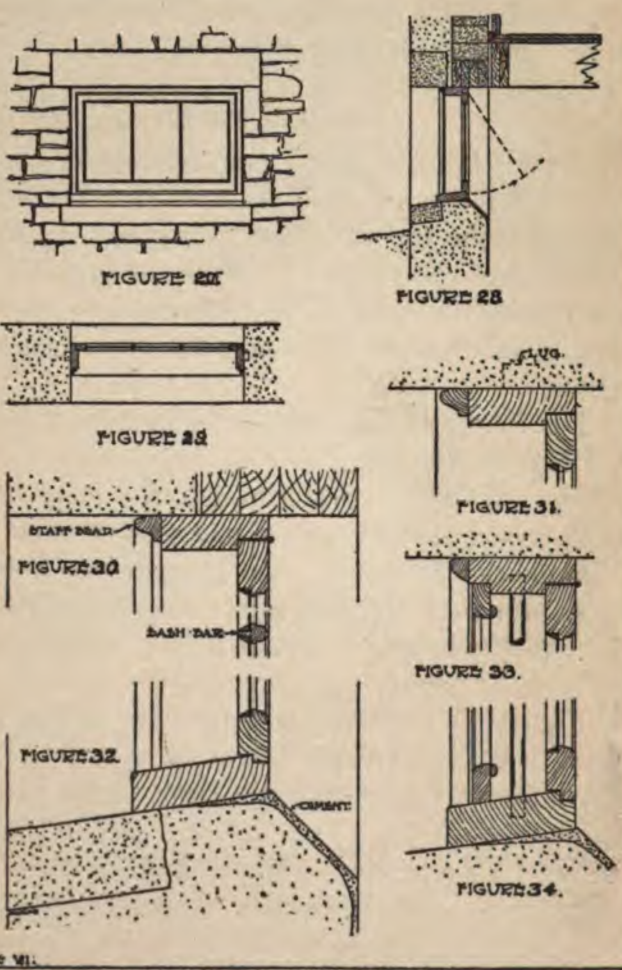


PLATE VII.

BUILDING CONSTRUCTION.

## Building Construction

In the East, spruce and hemlock are commonly used in the framework of cottages, and occasionally oak in the better class of buildings. In the South and West, other materials indigenous to the particular locations are employed.

Fig. 35 shows the use of shingles for the exterior covering of a house, and Fig. 36 illustrates the use of clapboards.

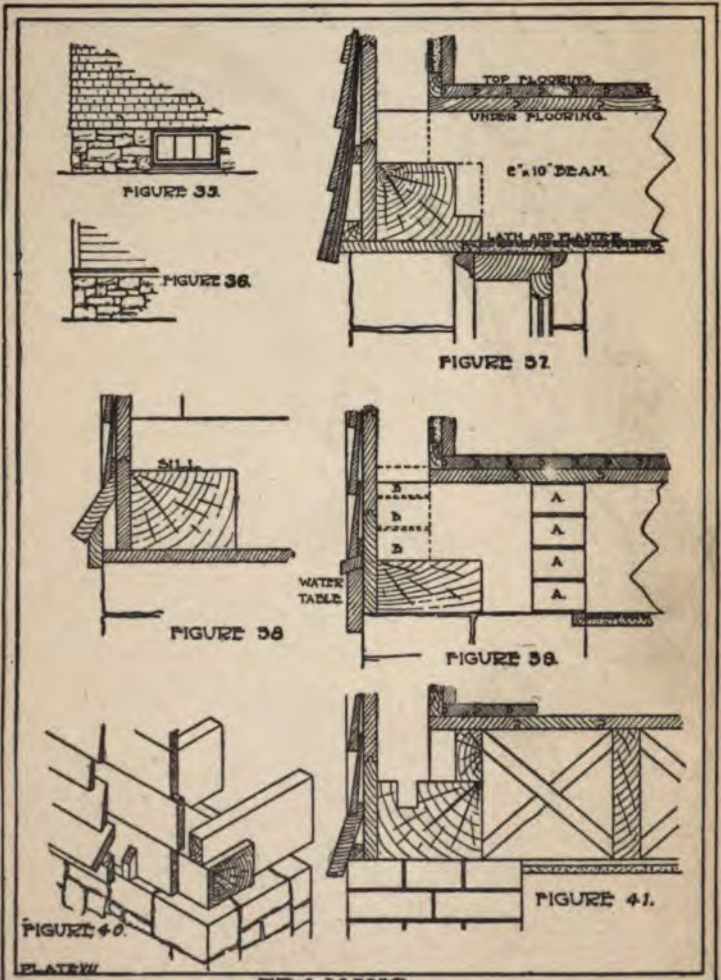
Fig. 37 is a section showing the construction of the framework at the first tier of beams. The main sill is the first piece of timber to be put in place, and should be well bedded in mortar on the walls so that it may have an even bearing at every point. It should have a halved joint at all corners, and if splicing is necessary, it should be done by means of a scarfed joint. This cut also shows a base course of shingles. Three forms of base courses, where clapboards are used, are shown in Figs. 38, 39 and 41.

At "A," Fig. 39, is shown a fire stop of bricks laid between the floor beams, which should never be omitted. It also serves as a stop for wind and vermin. It is frequently built on the sill as indicated by the dotted lines at "B."

Fig. 40 shows an isometric view of the base of the framework.

Fig. 41 shows the cross bridging between the floor beams. There should be a row of cross bridging for every eight feet of span. This cut also shows the studs mortised into the sill, a constructive feature only used in the best grade of work.

Fig. 42 shows an elevation at the corner of a building, from the sill to the rafters. The girts



FRAMING.

are mortised and tenoned into the corner posts and pinned with hardwood pins. The braces are mortised and tenoned into the corner posts, sills, girts, and plates, and are pinned with hardwood pins.

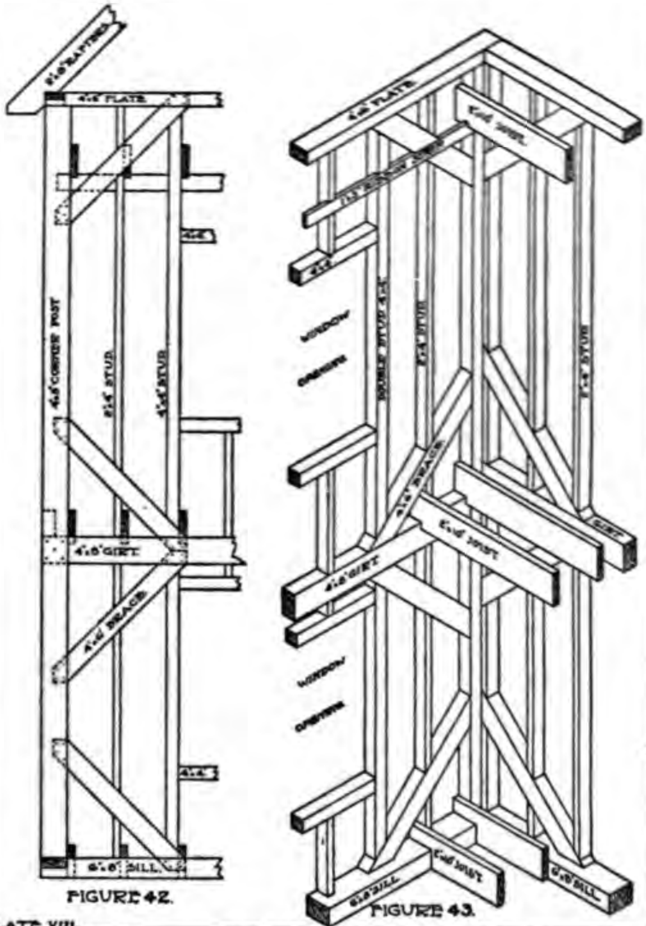


FIGURE 42.

FIGURE 43.

PLATE VIII.

FRAMING.

The second tier of beams are notched over the girts, the ribbon strips, or ledger boards, as they are also called, are notched one inch into the studs, braces, and posts, and should be well spiked. The third tier of beams should be notched over this ribbon strip.

All timber should be sound, well seasoned, and free from any imperfections materially impairing its durability or strength, and should be set with the crowning edge up.

Care should be exercised in framing so that important timbers will not require cutting for pipes, chimneys, etc. All timber should be kept at least two inches from the outside of the chimneys, and in no case allowed to rest on the chimneys.

## Joints Used in Framing

Plate IX illustrates and shows the application of the principal joints used in framing. Starting with the main sill, Fig. 44, the method of jointing at the corners is shown; the joint being known as angle halving. The corner post and studs are mortised into sill. This is done in the best work, the common way being to cut off posts and studs with square ends, and spike to sill and girt. The beams are shown let into the sill.

Fig. 45 illustrates tee halving, as in the case of wall plates coming together at right angles.

Fig. 46 illustrates beveled halving. This joint is used in splicing plates and sills.

Fig. 47 illustrates dovetailed halving.

Fig. 48 shows the girt framed into corner post with a mortise and tenon joint, pinned with hardwood pins or well spiked.

Fig. 49 shows the girt framed into corner post

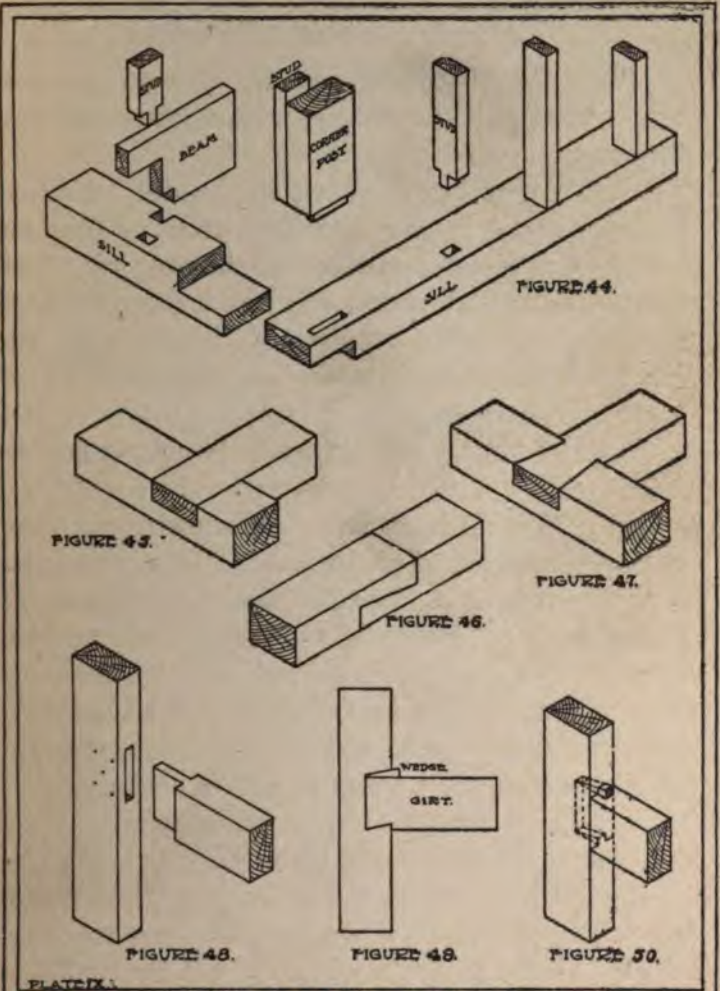


PLATE IX.

FRAMING JOINTS.

with a dovetailed tenon joint. The girt is secured firmly in place by driving the wedge shown.

Fig. 50 shows an isometric view of the dovetailed tenon joint.

### Framing Around a Fireplace

Plate X illustrates the use of the tusk and tenon joint and the wrought iron joist hanger in fireplace framing.

One-half of Fig. 51 shows the header, trimmers, and tail beams framed together with the tusk and tenon joint, which is considered the best joint, both theoretically and practically; and the other half of the plan shows the use of the wrought iron hanger, which is used when it is important to preserve the entire strength of the timbers.

Fig. 52 illustrates the use of hanger to support tail beam.

Fig. 53 is an isometric view showing construction of the tusk and tenon joint. This joint is also shown in Fig. 54. The thickness of the tenon "X" is one-sixth the depth of the beam, and the tenon is so fixed that it has its lowest surface in the center of the depth of the beam. "Z" is the tusk which bears weight of the header and is let into the trimmer about one and one-half inches and secured in place by means of the hardwood wedge, "Y."

The projection of the tenon beyond the surface of the beam, as well as the wedge, are omitted when they would be in the way. This construction is illustrated in Fig. 55, which shows the tenon secured with a hardwood pin through the center of the header; and is also shown in Fig. 56, where it is secured in place by means of a three-quarter-inch bolt. A hole is cut in the beam as shown, to

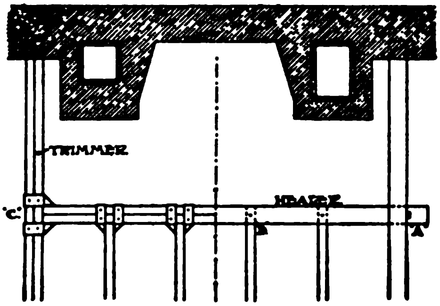


FIGURE 51

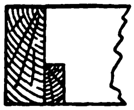


FIGURE 57.

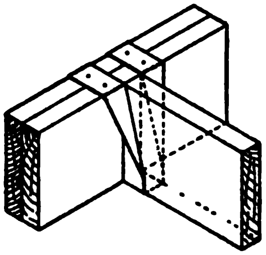


FIGURE 52.

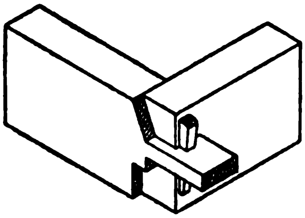


FIGURE 53.

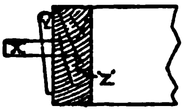


FIGURE 54

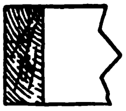


FIGURE 55

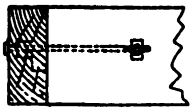


FIGURE 56

PLATE X.

FRAMING.

receive the nut, and is made large enough so that nut may be turned.

Fig. 57 shows a cheaper method of framing' which is used to a considerable extent, though not with as satisfactory results as the previous examples. The tail beam is supported on a "two-by four" joist, spiked to the header.

## Girders

Fig. 58 illustrates a cellar girder of six-inch by eight-inch yellow pine supported on a twelve-inch by twelve inch brick pier with bluestone cap. The floor beams are let into girder to a depth of four inches. The top two inches of beam rests on top of girder, thus making the under side of girder flush with the under side of floor beam.

Fig. 59 illustrates another flush girder frequently employed though not as good as preceding example. It consists of a girder composed of three of the floor beams well spiked together, with two-inch by four-inch strips well spiked on to support floor beams which are notched over them.

Fig. 60 shows an ordinary girder with beams resting on top. Beams should be lapped over girder and spiked together as shown.

Fig. 61 illustrates the construction of an interior partition running at right angles to the direction of the floor beams. A rough flooring, usually of seven-eighths-inch by eight-inch matched spruce or hemlock, is laid diagonally over floor beams and well nailed to them. On top of this floor, the partition is erected by putting down a two-inch by four-inch partition sill or shoe and then raising the studs, which are usually of two-inch by four-inch stuff set sixteen inches on centers. A seven-eighths-inch by two-inch ground is nailed at the

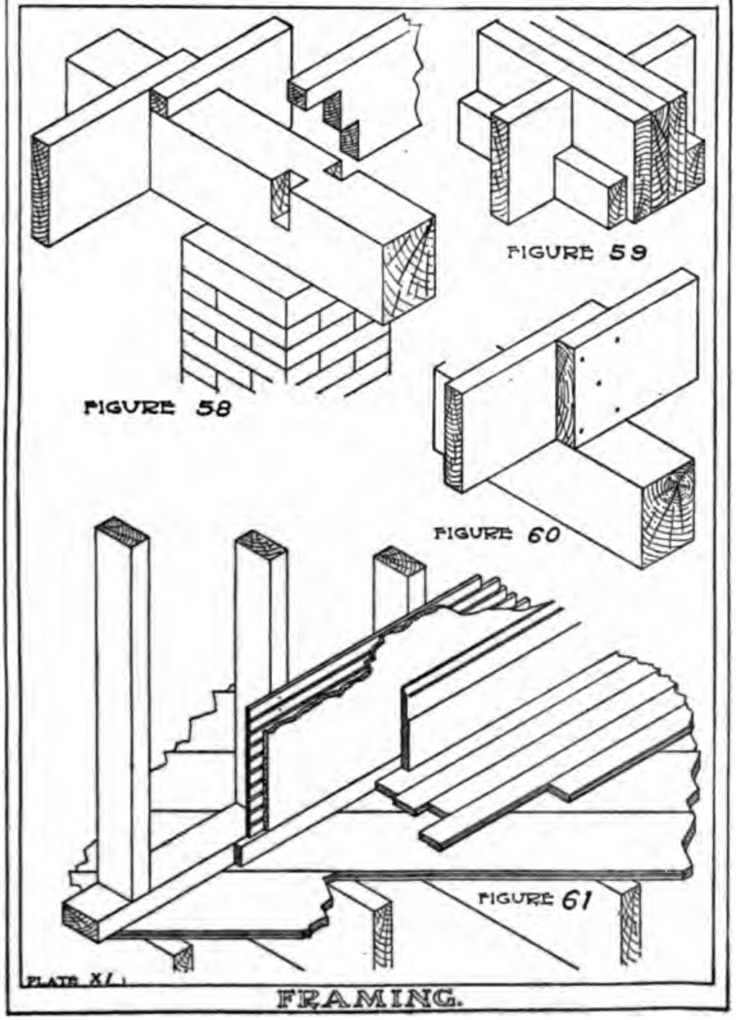


FIGURE 58

FIGURE 59

FIGURE 60

FIGURE 61

PLATE XI

FRAMING.

floor angle to serve as a gauge for lath and plaster and as a nailing for base. The finished floor is shown extending under the base and is generally of seven-eighths-inch stuff, matched, and not over three inches wide. A layer of deafening paper should be put between rough and finished floors. Boards should be blind nailed to every bearing and laid with end joints broken. Partitions are frequently made sound proof by filling in between studding with brick, as in the case of a frame partition between any living room and a kitchen, laundry or other room where there is any noise.

## The Fireplace

A fireplace when properly built should give a fair amount of heat with ordinary attention and should not smoke.

The principal points of construction are first a properly constructed throat which should be built well to the front and directly over the center of fireplace. The width of throat indicated at "A," Fig. 63, should not be less than three inches and not over six inches in the ordinary fireplace where no damper is provided. Too frequently it is made too wide, and as a consequence, the air passes up the flue without being warmed and checks the draft. This causes smoky fireplaces, and in a great many cases of defective fireplaces a cure has been effected by simply contracting the throat. The flat ledge is built to deflect down drafts back into the warm rising air.

Each fireplace should have a separate flue; a good size being eight inches by twelve inches, and chimneys should be carried well above highest

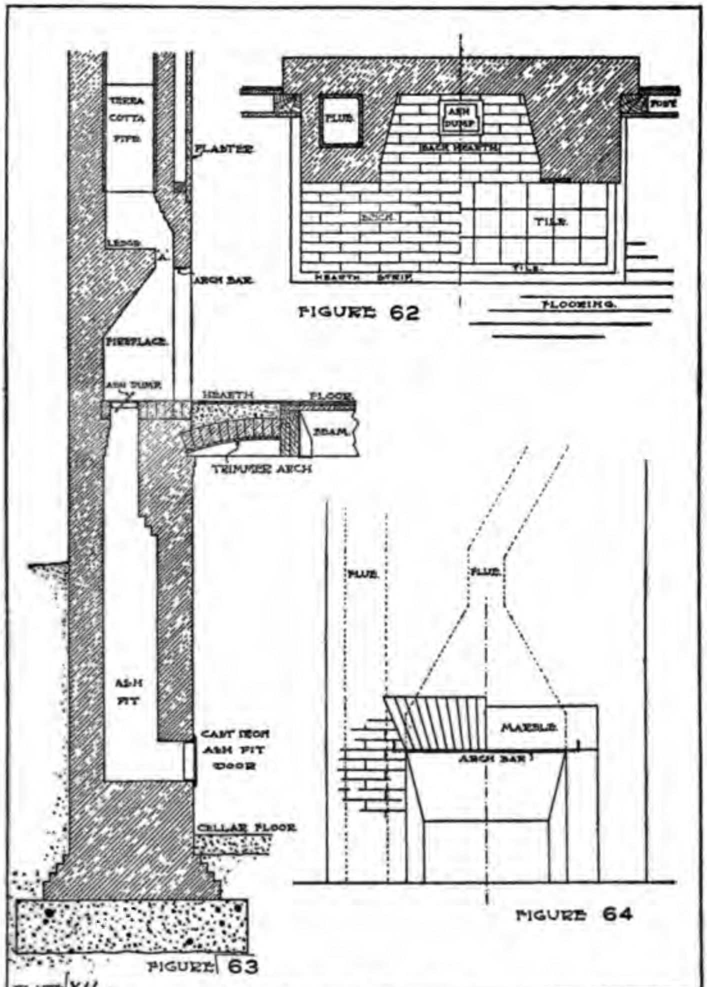


FIGURE 62

FIGURE 63

FIGURE 64

PLATE XII

A FIREPLACE.

point of roof. The throat should extend entirely across the fireplace opening and should be gradually contracted to the flue directly over middle of fireplace, as shown by dotted lines in Fig. 64. If necessary to carry flue over to one side of chimney, it should be deflected by easy bends as indicated by dotted lines.

Flues, where lined with terra cotta pipe, only require four inches of brick around same, but where unlined, should have eight inches of brick with joints struck smooth on inside—not plastered. Flue lining is much to be preferred. Chimneys above roof should be laid up in cement mortar, one of cement to two of sand.

Back of fireplace should incline forward to throat and jambs should be splayed rather than set at right angles to face of fireplace, as this will reflect more heat into room.

Fig. 63 also shows the construction of ash dump and pit, which should never be omitted.

Fireplaces are commonly two feet six inches to three feet wide, one foot four inches to one foot eight inches deep and two feet six inches high. The arch across opening is supported on a one-half inch by two and one-half inch iron bar, slightly cambered and with ends turned up as shown in Fig. 64.

The trimmer arch consists of a one rowlock arch of bricks laid upon centering constructed by carpenter, one end of which is secured to header, while the other end rests on a brick ledge corbelled out for it. A concrete filling is put over arch and brought to a level with rough flooring. On top of this tile hearth is set.

The back hearth and back and jambs of fireplace opening are usually of firebrick. The front hearth and facings are of brick, tile or marble.

## Cellar Windows

Plate XIII illustrates the construction of a double hung sash window in a brick cellar wall. The illustration shows the construction so clearly that little explanation seems necessary.

Fig. 65 is a section through the head of the window. The cellar ceiling is shown plastered and the inside of the window is finished to correspond with the rooms on the upper floors. When the window occurs in an unfinished portion of the cellar, the finished woodwork, such as trim, stop bead, stool, and apron, is omitted, and a plain casing put on inside of frame. Space above window head, marked "A," should be filled up with mortar to make a draft-proof job.

Fig. 66 is a section through the meeting rails.

Fig. 67 is a section through the window sill. The space between brickwork and underside of wooden sill, marked "B," should also be filled up with mortar. The inside of brick foundation walls is shown furred with 1 by 2-inch strips and then lathed and plastered.

Fig. 68 is a section through the window jamb. Space marked "C" should be well slushed up with mortar.

Fig. 69 is an isometric view showing a little more clearly the relation of the various members at the window head.

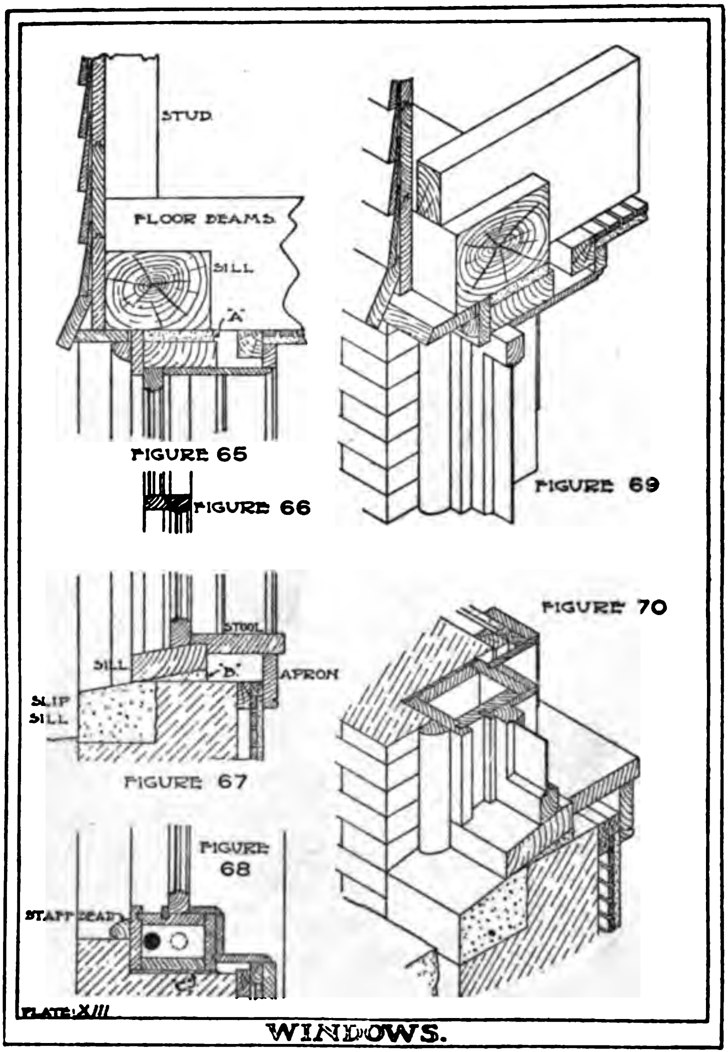


PLATE: XIII

WINDOWS.

Fig. 70 is an isometric view through the sill of window.

## Windows in Frame Walls

Plate XIV illustrates the construction of a double hung sash window in a frame wall. It is what is known as a skeleton frame without a ground casing, and is the kind of window frame that is used in the cheapest grade of work.

Principal among its weak constructive features are the omission of grounds to nail trim to, the use of a single sill instead of a sill and sub-sill and the omission of a ground casing, without which a true pulley stile cannot be insured.

Fig. 71 is a section through the head.

Fig. 72 is a section through the jamb.

Fig. 73 is a section through the sill.

Fig. 74 is an isometric view of head.

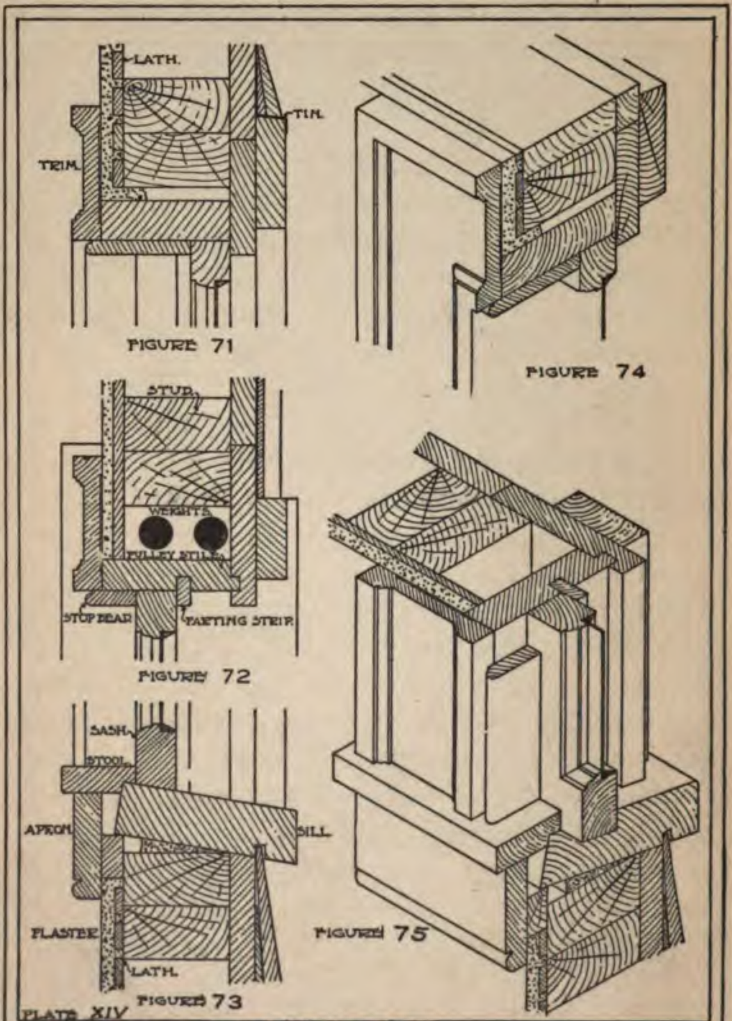
Fig. 75 is an isometric view of jamb and sill.

Plates XV and XVI continue the illustration of double hung sash windows in frame walls. The first plate illustrates a skeleton frame with a ground casing.

Fig. 76 is a section through the window head and could be improved by the use of grounds nailed to studs to serve as a gauge for plastering and as a nailing for the trim. The tops of all windows on exterior are almost always exposed to the weather and, as indicated in this case, should be well flashed with tin or copper.

Fig. 77 shows a section through the meeting rails.

Fig. 78 is a section through the jamb of the window and shows the ground casing, marked "G C." When grounds and ground casings are



WINDOWS.

omitted, the trim must always be wide enough to get a nailing into the studs. The outside archi trave should always be at least one and one-eighth inches thick or better, one and

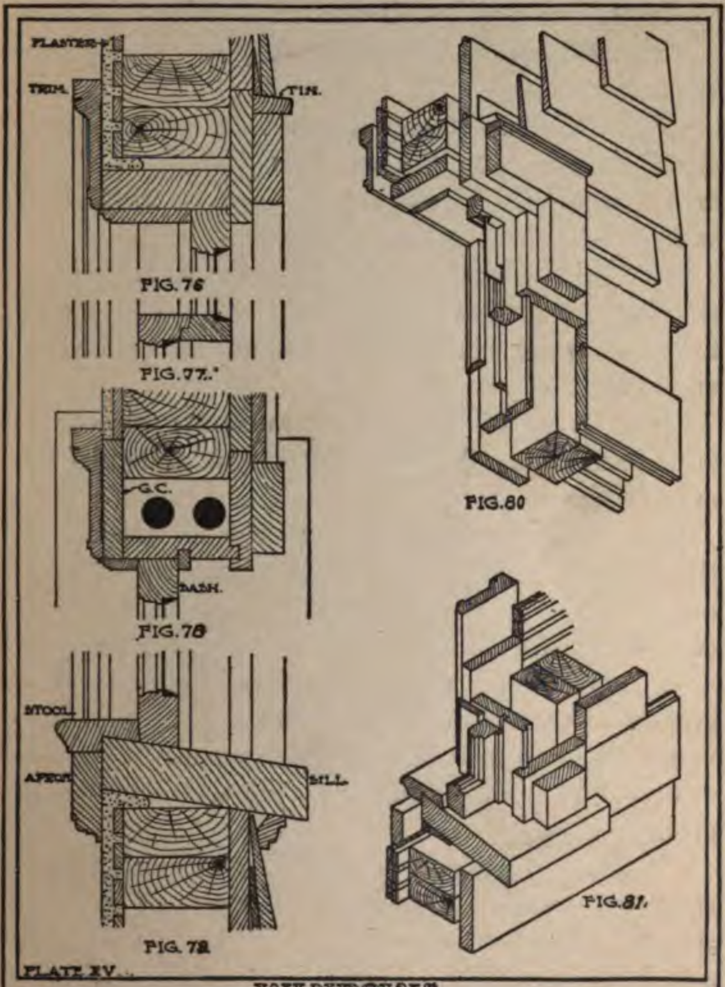


PLATE XV.

WINDOWS.

three-eighths inches, to receive clapboards or shingles.

Fig. 79 is a section through the sill of the window. The openings around sills and heads of windows should always be plastered up with "scratch" mortar, as shown.

Figs. 80 and 81 are isometric views of the previous sections.

Plate XVI illustrates a somewhat better method of constructing the window frame and shows how a mosquito screen may be put on outside of sash.

Fig. 82 is a section through the head and shows the use of grounds, marked "G." The inside finish is more elaborate than in the preceding examples.

Fig. 83 shows the sliding mosquito screen on outside of sash. The running strip is nailed to the outside casing.

Fig. 84 is a section through the sill and shows the bottom rail of mosquito frame and the ground, marked "G." Also, instead of a single sill, as is used in cheaper work, a sill and sub-sill are provided, same being put together in white lead. The groove or water nose on bottom rail of sash prevents water from entering under same.

Fig. 85 is an elevation showing the inside finish around window.

**We will consider two special methods of constructing double hung sash windows.** The first, shown in illustrations on Plate XVII, is a window so constructed as to permit the use of mosquito screen, and blinds with swivel slats outside of the sashes. This is accomplished by putting the outside casing "D," over the sheathing boards "C," which makes a wider box for sash weights and

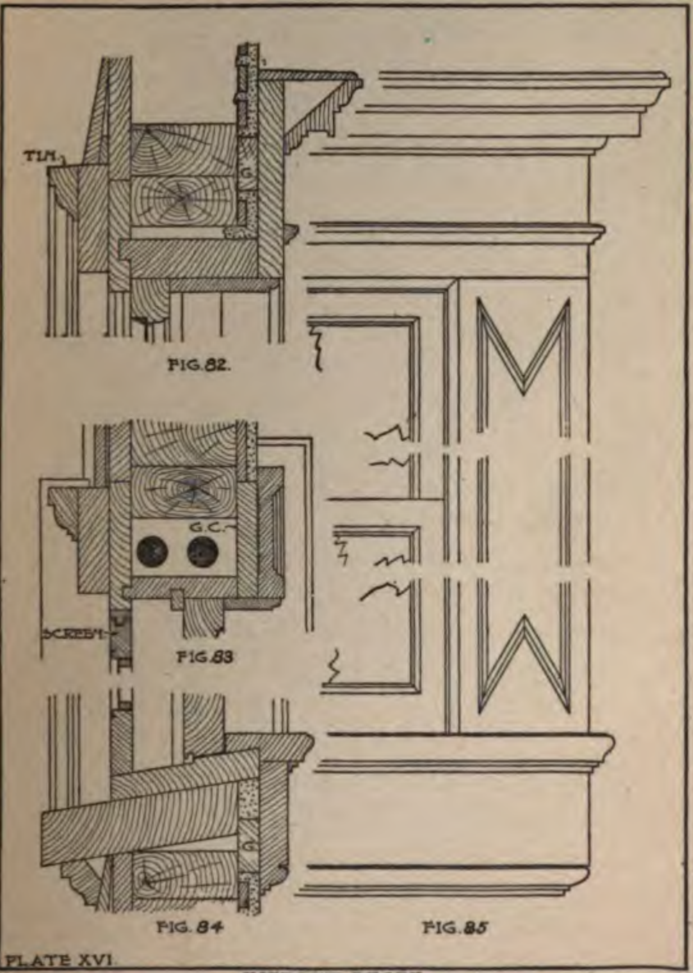


FIG. 82. FIG. 83 FIG. 84 FIG. 85

PLATE XVI

WINDOWS.

allows the piece "A" to be set for mosquito screen. The space between mosquito screen and blind "B" is required for blind fasteners.

Fig. 86 is a section through the window head.

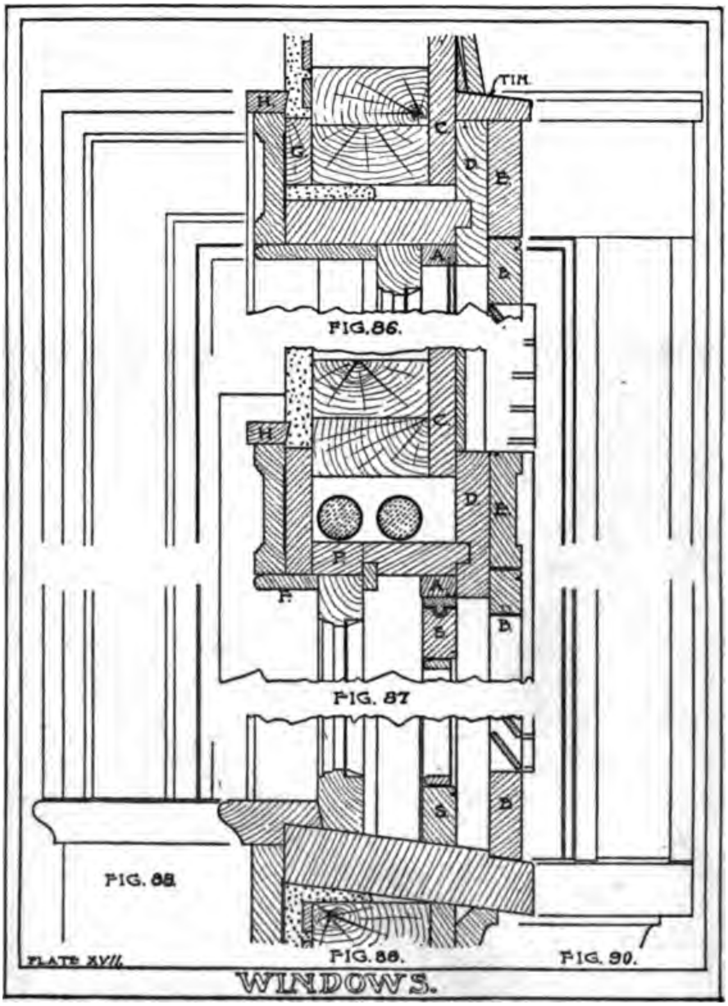


PLATE XVII.

WINDOWS.

The ground "G" serves as a gauge for plastering and as a nailing for the trim and should always be used in the best work.

Fig. 87 is a section through the jamb of the window. The stop bead "F" should never be less than one and three-fourths inches wide so as to allow proper space for the window shades. At "P" a pocket is formed in pulley style for access to sash weights.

Fig. 88 is a section through the sill of the window. The sill should be grooved out three-eighths of an inch for pulley stile.

In all good work a back mould "H" should always be provided. This mould has a beveled edge which may be planed off to fit the unevenness of the plaster work.

Figs. 89 and 90 are respectively interior and exterior elevations of the window.

Plate XVIII illustrates a somewhat better method of construction than any previously shown. The advantage of having mosquito screen and blinds outside of sashes is secured in this case by using four by five-inch studs. The construction is known as a "box frame," the back casing "A" forming the box and insuring a rigid pulley style and consequently accurately fitting sashes. The window sill forms the bottom of the weight box, and is grooved out three-eighths of an inch for the pulley stile.

Fig. 91 is a section through the head of the window.

Fig. 92 is a section through the jamb of the window. The use of the strip of wood "B," dividing the weight box, is an improvement used only in the best grade work.

Fig. 93 is a section through the sill of the win-

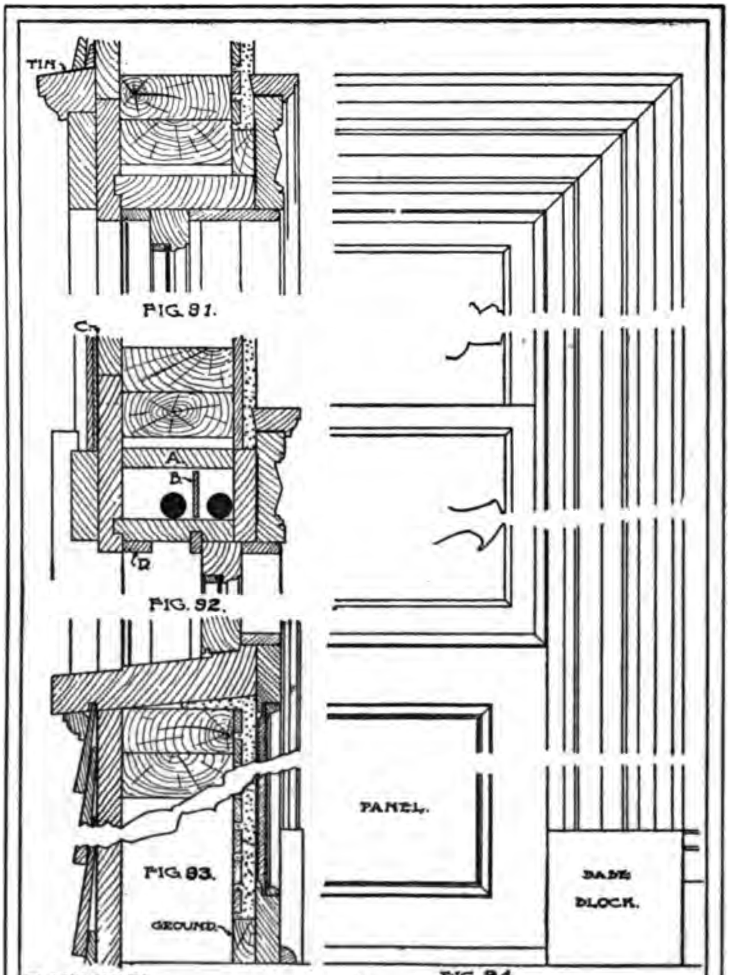


PLATE XVIII

WINDOWS.

dow, and shows the use of the moulded panel back under the window in place of the stool and apron finish.

Fig. 94 is an interior elevation of the window.

Plate XIX takes up the **construction of a double-hung sash frame in a double-plastered wall,** with mosquito screen and blinds outside of the sashes and ample space for window shades on the inside stop head. Also, the inside finish is of a somewhat better character than in preceding examples.

In locations exposed to severe cold weather and penetrating winds the double-plastered wall is particularly desirable. The walls are constructed of the usual two by four-inch studs, with one four by four-inch or two two by four-inch studs at all openings. The outside of the wall is sheathed with matched boards, laid horizontally or diagonally, preferably the latter way, and the sheathing paper is then put on; being well lapped at all corners and around all openings. On top of this the shingles, clapboards or other covering material is placed.

The inside of the wall is lathed and plastered two coats—scratch coat and brown coat. One-inch by two-inch grounds are nailed to studs as indicated at "G." A one-inch air space is then formed by means of one-inch by two-inch furring strips, marked "F," and the wall is again lathed and plastered, this time with three coats of plaster. All spaces around head, sill and jambs of window frame should be well filled up with scratch mortar, so as to be absolutely wind-proof.

[illegible] two pockets are [illegible] the pulley stile, for [illegible] When the strip of [illegible] the pocket, [illegible] the pulley stile, is

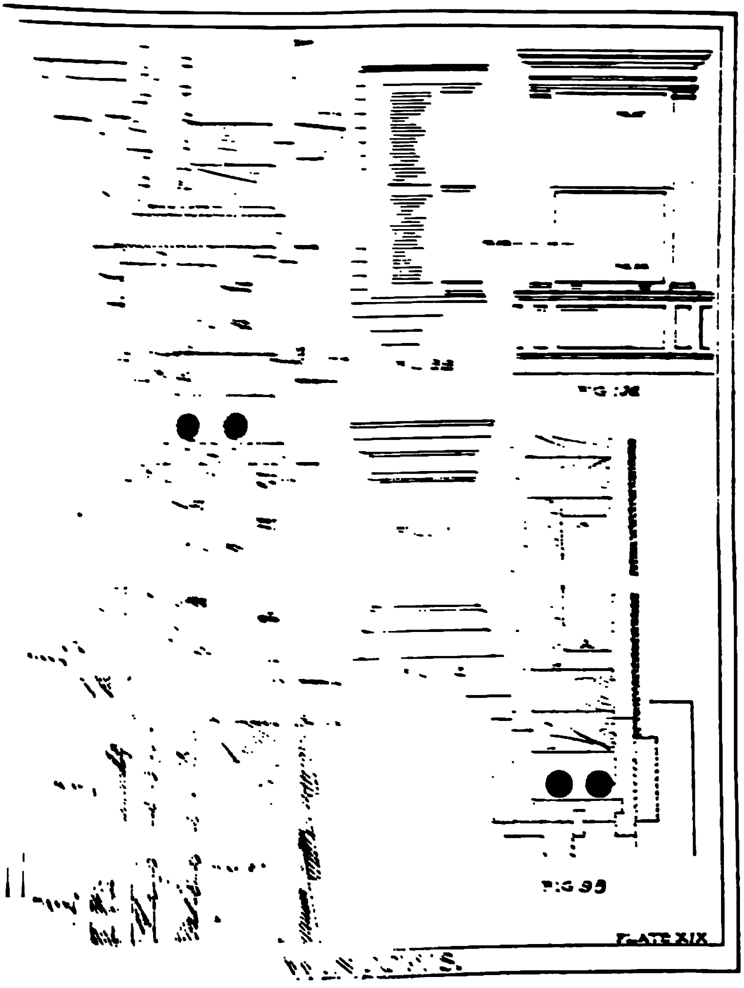


FIG. 98

FIG. 99

PLATE XIX

sufficient. The flashing shown at the outside architrave is used only in the best grade of work.

The interior finish consists of a pedestal base or wainscoting, the top member of which forms the window stool; pilaster jambs and an entablature head. With a finish of this kind the stop bead, marked "S," should always be made thick enough to take up the projecting mouldings of the cap and base, which butt against it. The panel under the window should be constructed so that it can be readily removed in case it cracks or is damaged, by taking off the panel moulding. The frieze of the entablature should be on a line with the face of the pilaster, and the face of the wainscoting should be kept on a line with the plinth of the pilaster base. Cap and base are shown in Fig. 101 and 102.

Fig. 99 is an exterior elevation and Fig. 100 an interior elevation of the window.

Another method of constructing double-plastered walls and a window frame for same is shown in Fig. 98. In this case one-inch by two-inch furring strips, marked "A," are nailed to the studs as a bearing for the lath and are placed so as to allow a one-inch air space between the inside plastering and the back plastering. The frame could be improved by placing the outside casing outside of the sheathing boards, thereby giving enough width to the pulley stile to permit of both screen and blinds outside of sashes.

In Plate XX we **illustrate a storm-resisting window,** with a double set of sashes, in a double-plastered wall, for use in a location exposed to very severe weather throughout the entire or greater part of the year.

Three by six-inch studs are used for the outside walls and the window has a box frame with a sepa-

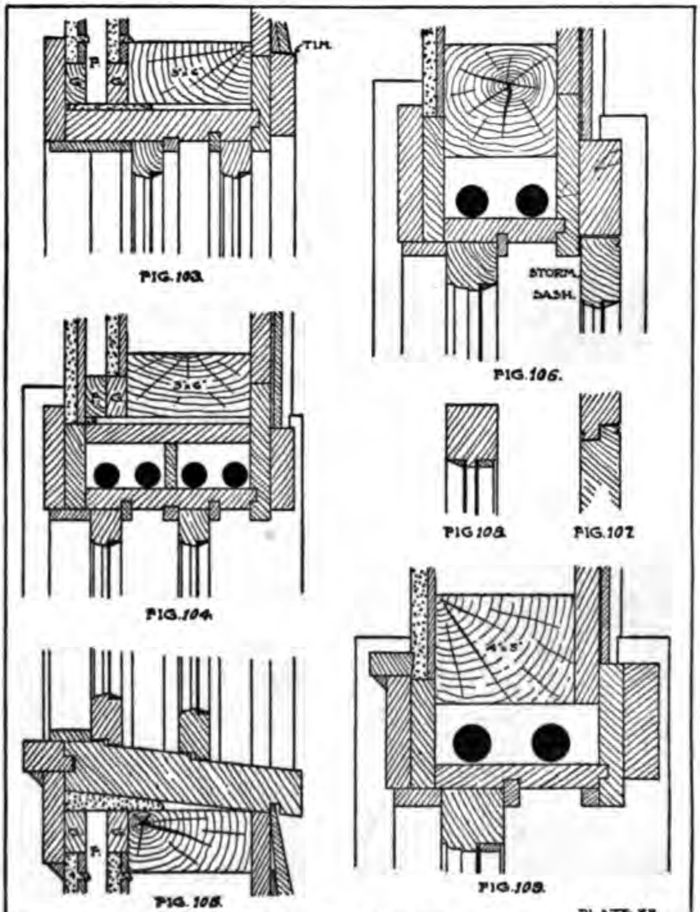


PLATE XX

WINDOWS.

rate weight box for each set of sashes. The sill should be gotten out of two-and-one-half inch stuff.

Fig. 106 shows how storm sash may be substituted for blinds when cold weather sets in. The thickness of storm sash and outside architrave should be at least one and one-half inches, or better, one and three-quarter inches. The joint at the meeting stiles of storm sash is shown in Fig. 107. Sash are usually rebated one-half inch.

Fig. 108 shows a double-glazed sash for exposed locations. The principal objection to their use is that dust will sooner or later get between the sheets of glass, which, with the sweating in cold weather, will soil and streak the glass where it is inaccessible for cleaning.

Fig 109 shows a window frame constructed for the use of heavy sashes the use of four-inch by five-inch studs and the placing of the outside casing over the sheathing boards gives the required width to the pulley stile.

We will conclude the study of double hung windows in frame walls; illustrating in Plate XXI a window with inside sliding blinds and in Plate XXII a double hung window in a brick veneer wall.

In Plate XXI we have shown the **inside blinds sliding in grooves on the window jambs,** and, when not in use, sliding down in a pocket (Fig. 112) behind a moulded panel back. The pocket is covered by a hinged stool "A," which raises up as indicated by the dotted lines when it is desired to use the blinds.

Rather than have the sliding grooves and blinds project in the room, we have made the wall thicker by the use of three by six-inch studs, with the exception of that portion of wall under window

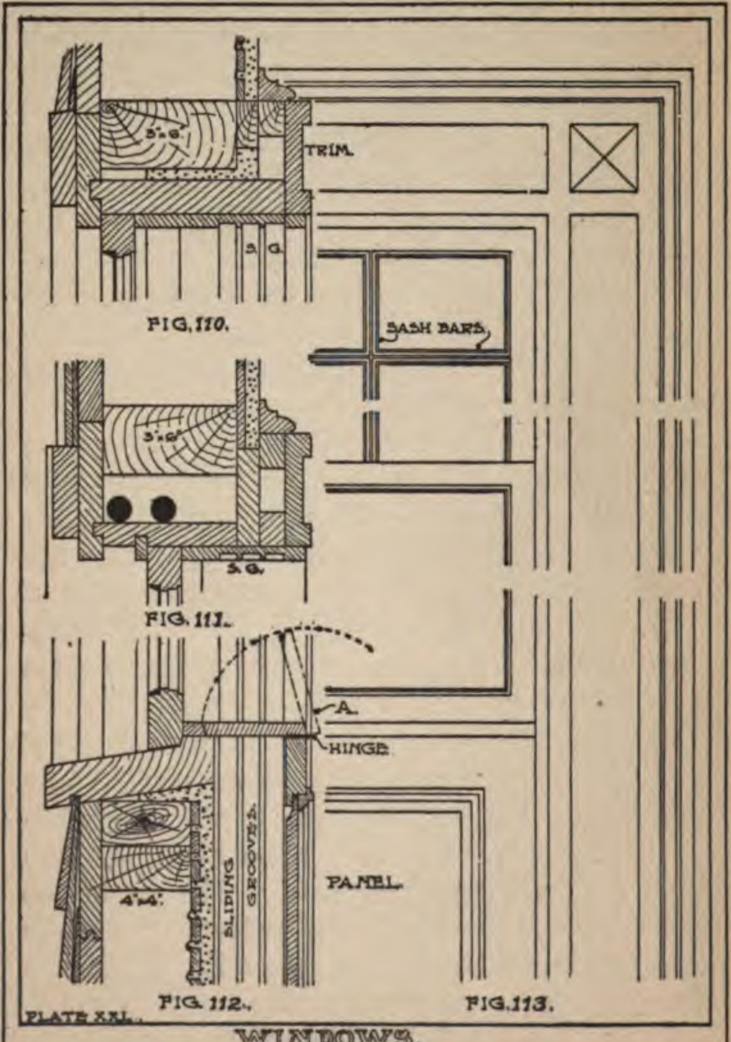


PLATE XXI.

WINDOWS.

frame where we have used two two by four-inch studs. When the wall is not made thick enough to take up the extra thickness of blind box and slides, the whole window is made to project in the room, causing a more or less unsightly appearance. The window frame itself is constructed in pretty much the usual manner, the exceptions being the extra width of window head and pulley stile caused by thickness of wall and the omission of the inside stop beads, in place of which we have the sliding grooves marked "S. G."

The plastering behind the blind box should not be omitted. The scratch and brown coats, however, are sufficient. All spaces around window frame should be well filled up with scratch mortar.

In Plate XXII the wall is constructed of two by four-inch studs, doubled at openings; plastered on the inside; sheathed diagonally on the outside with matched boards; then covered with waterproof sheathing paper; and then with four inches of brickwork. The veneer of brick should be tied to the frame wall every five courses, opposite every stud, with patent veneer ties, shown in Fig. 117. The tie is made of one-eighth-inch galvanized steel wire, and is far superior to the iron nails frequently used.

Brick veneer construction for exterior walls is largely used in many sections of the country, and seems constantly growing in favor.

The window frame is constructed in the usual manner, with a moulded staff bead to cover the joint of brickwork and window frame.

Fig. 114 is a section through the window head. Fig. 115 is a section through the jamb. Fig. 116 is a section through the still, and shows the wood sill lapping over the stone sill. The stone sill is

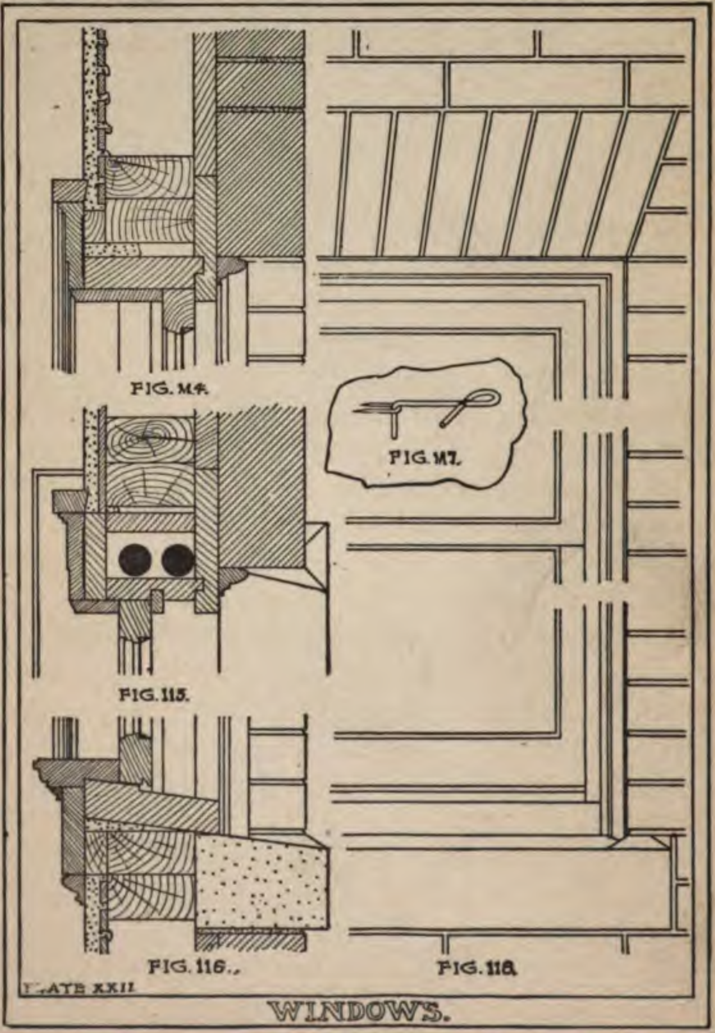


PLATE XXII

WINDOWS.

made the thickness of two courses of brick, four inches longer than the width of brick opening, and six inches deep. It is made with a wash and with lugs at each end, projects one inch beyond the face of the wall, and extends back to the studding, over the sheathing. Fig. 118 is an exterior elevation of the window.

### Windows in Brick Walls

We will start a consideration of double hung sash frames in brick walls.

Plate XXIII illustrates a well constructed frame in a thirteen-inch wall; the window finishing with an arch on the outside and a square head on the inside.

Fig. 119 is a section through the window head at the center line. The opening is spanned on the outside by a segmental arch "B" of face brick, rubbed to the required shape and laid on a temporary wood center. This center should not be "stuck" until the mortar has thoroughly set.

The inner eight inches is spanned by a permanent wood center "C," usually constructed of two-inch spruce and made of sufficient length to give a bearing of four inches on the wall on each side of the window opening. On top of this center, a two-rowlock relieving arch "A," is turned.

The wall is furred on the inside as indicated at "E," and is then lathed and plastered; grounds being set as shown.

This furring of late is frequently omitted and the plaster applied on the brick wall itself, after it has been made impervious to water by a heavy coat of one of the many waterproof paints now on the market. This paint prevents the dampness, which penetrates the wall, from discoloring the plaster work.

Fig. 120 is a section through the jamb of the

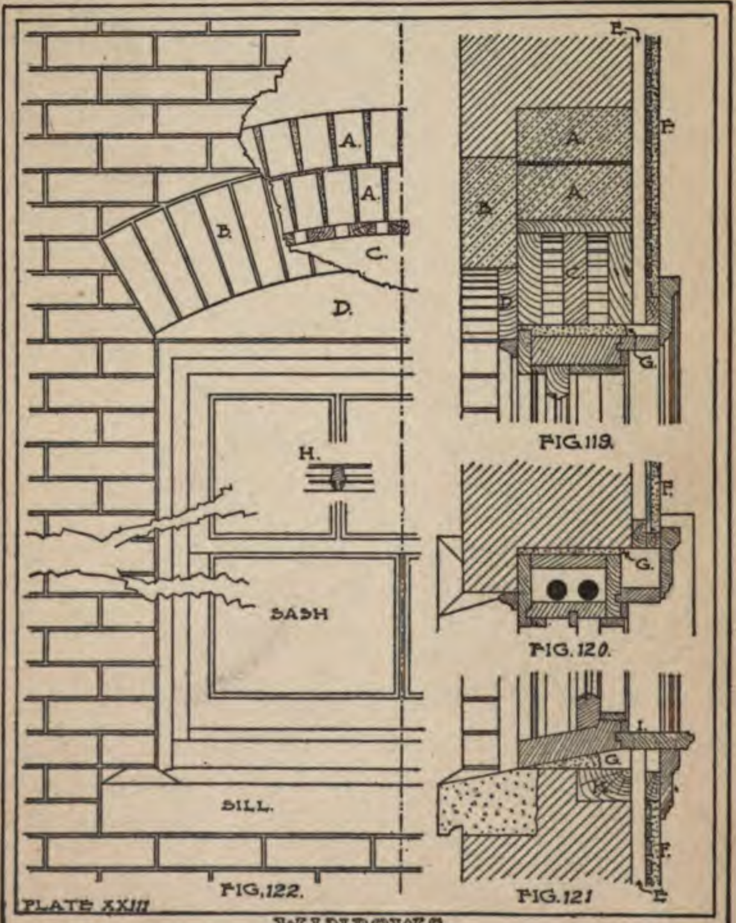


FIG. 119.

FIG. 120.

FIG. 122.

FIG. 121

PLATE XXIII

WINDOWS.

window. The space marked "G" in this and other sections should be well filled with scratch mortar or in better work, should be hand caulked with oakum, to keep out the air. The joint of the window frame with the brickwork is covered with a moulded staff bead as shown. This staff bead should be moulded so as to form a shadow line between the mould and the brickwork. The shadow line hides the unevenness of the brickwork.

Fig. 121 is a section through the sill of the window. The stone sill should be of a thickness that will properly lay up with the brickwork. It is usually as thick as two courses of brickwork and should be formed with a wash and with lugs to receive the brick jambs of the opening. When it projects beyond the face of the wall, it should have an undercut for water drip.

A two by four-inch joist, "K," is set on the inner face of the wall for a nailing for the furring, "E." The trim, instead of running to the floor, is shown finishing on a moulded stool, "I," with an apron, "J," underneath. The wooden sill should lap well over the stone sill.

Fig. 122 is an exterior elevation of the window. The piece "D" is put on as a finish to cover the wood center "C." At "H," is shown a section through the sash bars.

Plate XXIV illustrates a similar window in a brick opening spanned on the outside with a flat arch.

Fig. 123 is a section through the head and shows the inner section of the opening spanned with iron beams for the support of the floor joists which bear directly over the opening. These iron beams are necessary when there is not sufficient space between the window head and the under side of the floor joists, to turn a brick relieving arch on top of a timber lintel.

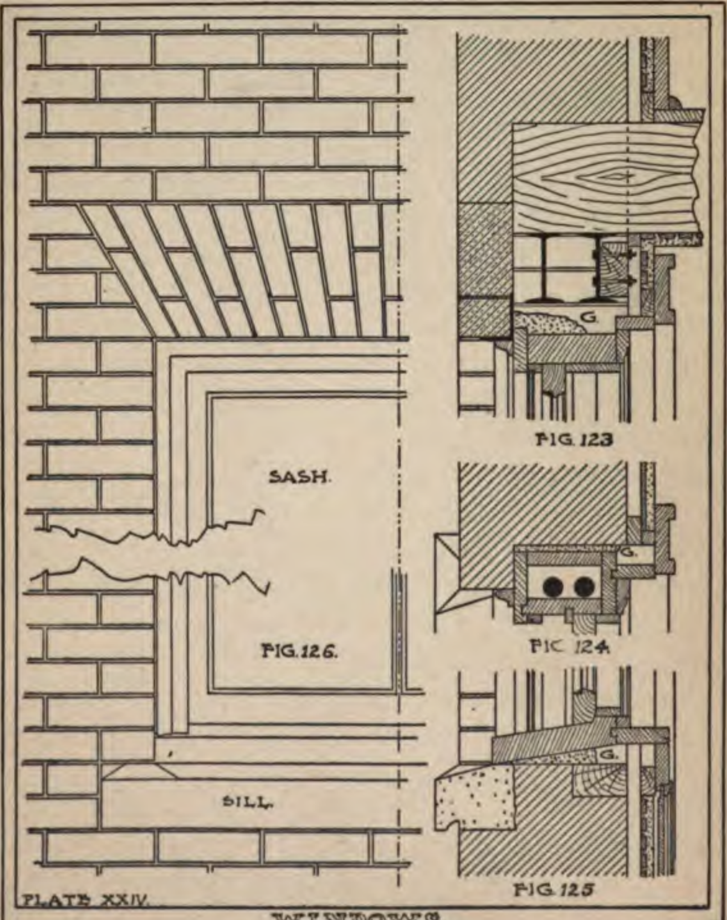


PLATE XXIV.

WINDOWS.

A piece of two by four stuff is bolted to the web of the inner iron beam as shown, to secure a nailing for the furring.

A two and one-half-inch by a three and one-half-inch angle iron is shown under the face arch, and is provided so as to prevent any settlement of the arch. Without some support of this kind, flat arches are very likely to sag in the center, causing a very unsightly appearance.

Fig. 124 is a section through the jamb.

Fig. 125 is a section through the sill. It shows the trim running to the floor and the space under window finished with a panel back.

Fig. 126 is an exterior elevation of the window.

Continuing the consideration of window construction, we illustrate in Plate XXV, a double hung sash window in an eighteen-inch brick wall.

Fig. 127 is a section through the window head. The opening is spanned on the outside with an arch of stone and on the inside a timber lintel is provided, and a rowlock relieving arch turned on top of same. Relieving arches are usually constructed with one rowlock to each eighteen inches or fraction thereof in the width of the brick opening. The timber lintel is constructed with two or three centers of two-inch stuff, cut to the required curvature. On top of these centers are nailed narrow wood strips called lags.

Fig. 128 is a section through the window jamb. The calking shown in this and other sections is to keep out penetrating winds. This calking is commonly done by filling around all openings, as shown, with scratch mortar, but in the highest grade work is done by hand-calking all the spaces around frame with oakum.

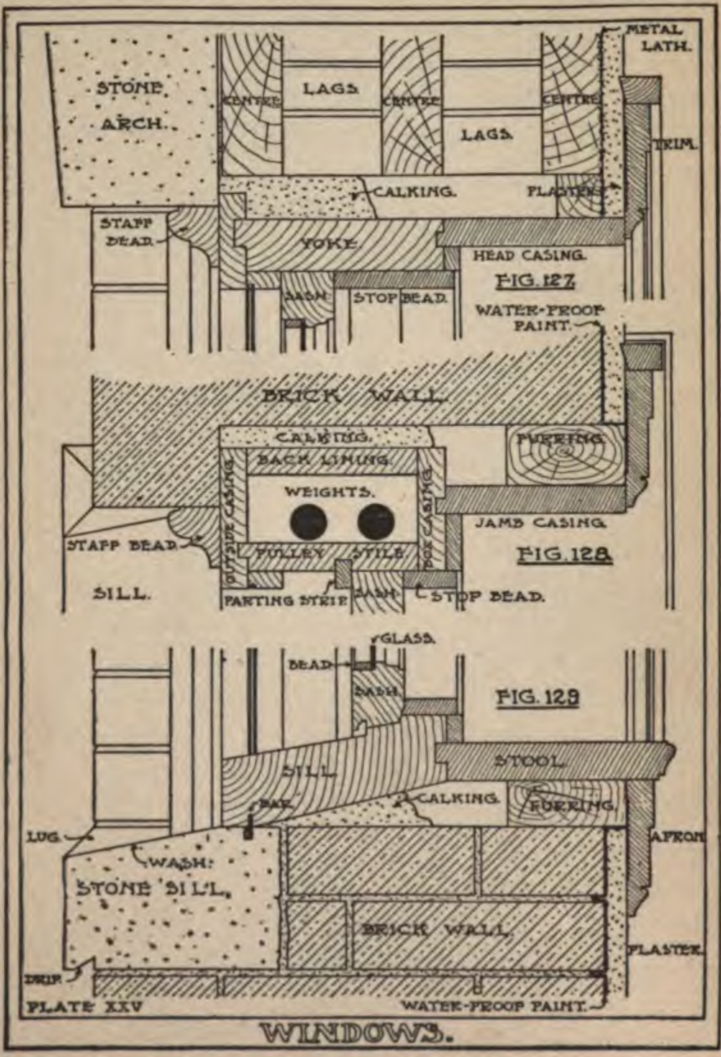


PLATE XXV

WINDOWS.

It will be noticed that furring and lathing of inside of walls is omitted, and the plaster applied directly to brickwork. When this is done, the wall should be thoroughly coated with a waterproof paint so as to make it absolutely impervious to moisture and dampness, which would discolor the finished plaster work. There are several of these paints now on the market, and, when properly applied, make a wall absolutely damp-resisting. Before the paint is applied, the mortar joints should be raked out enough to give a clinch for the plaster, as shown in Fig. 129.

This section is taken through the window sill, and its principal feature is the joint of the wood and stone sills. This joint is made water-tight by means of a galvanized iron bar or tongue which is let into a slot on the underside of the wood sill and lead-calked into a corresponding reglet in the stone sill. The stone sill is cut with wash and lugs on top, and with a water drip on the lower edge.

The sash are shown one and three-quarters inches thick and glazed with plate glass, bedded in putty and held in place with wood beads.

Metal lath is nailed to the timber lintel to afford a clinch for plaster. This lath will also be required over any recesses or pipe chases in masonry walls.

Plate XXVI illustrates another method of constructing a double hung window frame in a masonry wall. The opening is spanned on the outside by a moulded stone lintel and the inner eight inches of the wall is carried on an iron lintel

(Fig. 130). An iron lintel is usually provided when it is not convenient to turn a rowlock relieving arch over a timber lintel, as in the case of floor

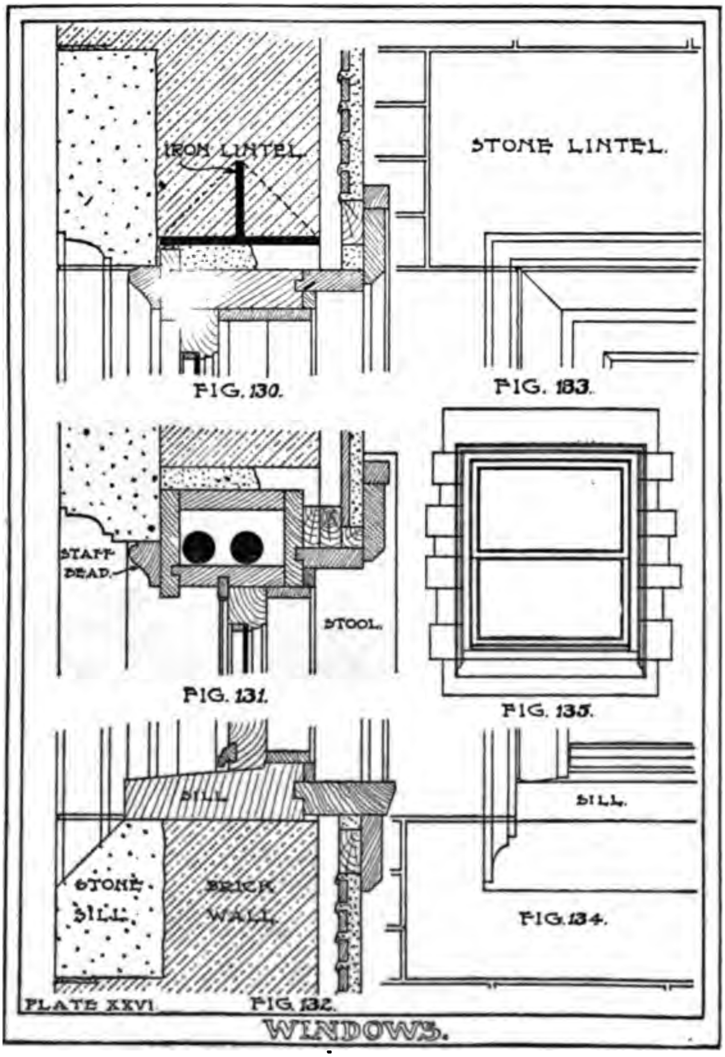


PLATE XXVI

WINDOWS.

beams bearing over opening, so close to window head as to make it impossible to turn an arch underneath them. They are also used over wide openings in preference to arches.

Fig. 131 is a section through the jamb of window. Stone quoins of various widths and heights are provided for masonry jambs.

Fig. 132 is a sill section and shows a moulded drip on bottom rail of sash.

Figs. 133–135 are exterior elevations.

**The use of inside blinds on double hung windows** in masonry walls is considered. Plate XXVII is a double hung window frame in a thirteen-inch brick wall. A stone lintel is provided on the outside over the opening; in depth it should equal the height of four or five courses of brick; its thickness should be not less than the brick reveal, nd it should have a bearing of about four inches on each brick jamb so as to take up with the brick joints. The opening is spanned on the inside with a timber lintel or center made up of three pieces of two-inch stuff, cut to the required curve, with cross strips across top called lags. On top of the wood center or lintel a rowlock arch is turned. Rowlock arches are usually made with one rowlock for each eighteen inches or fraction thereof in the width of masonry opening. The rise is usually made one inch for every eighteen inches of width of opening.

The sill of the masonry opening is of stone, the thickness of two courses of brick, of a depth that will overhang the wall on the outside about one and one-half or two inches, and will extend under the wooden sill not less than two inches. The sill is cut with a wash and lugs and on the underside of projecting part has an undercut or water nose.

The wall is furred on the inside with two by four-inch stuff, placed sixteen inches on centers, so as to give the required extra width for blind boxes.

The caulking of interstices at head sill and jambs of frame is shown of "scratch" mortar, but in the best grade of work is usually of oakum hand caulked, so as to make the construction absolutely wind proof.

Fig. 136 is a section showing the usual construction at the window head. The wide soffit may be paneled if desired. A moulded staff bead should always be used to cover the joint at the intersection of the frame with the masonry, on the outside. The lath, plaster and grounds are applied to the furring in the usual manner. The trim is mitred and tongued or doweled together at the head, a feature employed only where expense is not an all important consideration.

Fig. 137 is a section through the jamb and shows the construction of the blind box and the method of folding blinds. It will be observed that a special hinge is used on blinds, which prevents them from catching or sticking in the box. All the woodwork of box, which would be exposed to view when the blinds are closed, should be made of the same material as, and should conform to, the finish of the balance of the room. All the blind stiles should be rebated as shown.

The blinds are all shown with rolling slats, but frequently the blind fold, which is exposed to view when blinds are folded back in the pocket, is made paneled instead of with slats, so as to give the effect of a paneled window jamb.

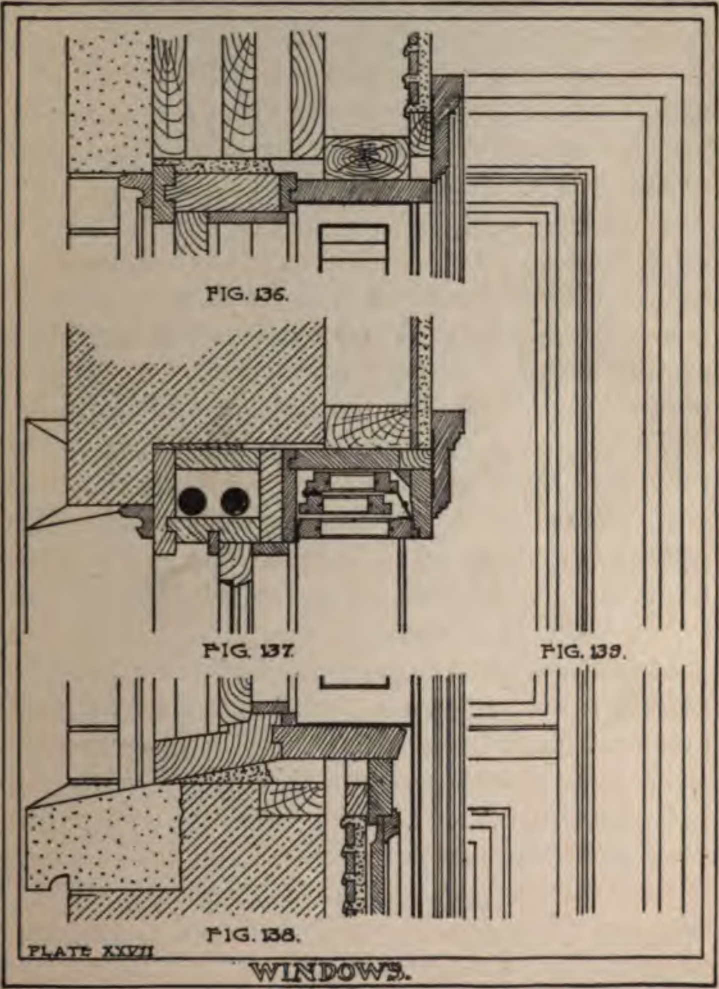


FIG. 136.

FIG. 137.

FIG. 139.

FIG. 138.

PLATE XXVII

WINDOWS.

The inside stop bead should be made at least one and three-fourth inches wide, or better two inches wide, so as to give plenty of space for shades between blinds and sashes.

The use of a strip dividing the weight box would be an improvement.

Fig. 138 is a section through the sill, which is finished on the inside with a moulded stool and panelback. Plastering should always be provided back of panelbacks, but the hard finish coat may be omitted.

A nailing strip for the furring is let into the brick work.

Fig. 139 is an elevation of the trim, which extends to floor; finishing on a base block or plinth, against the base butts.

Plate XXVIII shows a similar window frame, but without a pocket or box for the blinds. The ordinary hinges are used in this case.

Fig. 140 is a section through the head. The plastering is applied directly to the sixteen-inch brick wall, after it has first been coated on the inside with damp-resisting paint.

Fig. 141 is a section through the jamb. The trim is made with a separate wall mould or back band.

Fig. 142 is a section through the sill. A moulded drip is let into the lower rail of sash, to prevent water from entering under same.

Fig. 143 is an elevation showing the interior trim which finishes on a moulded stool and apron; both having returned ends.

**A double-hung sash window in a brick wall, with inside folding blinds set in a projecting box.**

The brick wall is thirteen inches thick and the opening is spanned on top by a stone lintel and has a stone sill cut with a wash on top, lugs at each end

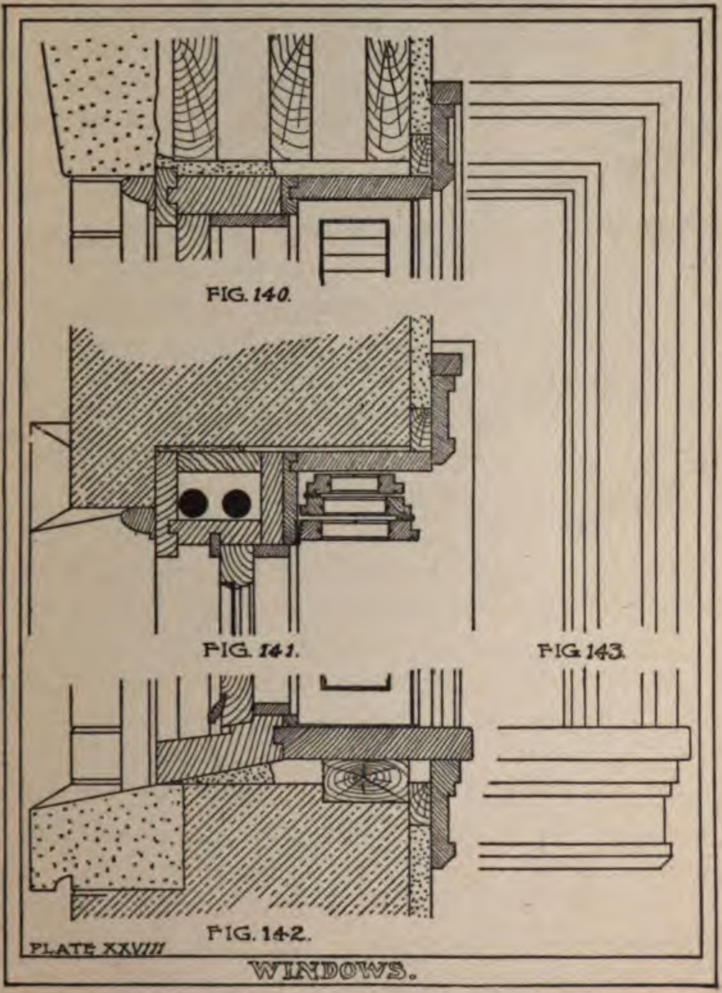


FIG. 140.

FIG. 141.

FIG. 143.

FIG. 142.

PLATE XXVIII

WINDOWS.

to receive the brick jambs, and drip or water nose on underside where it projects beyond the face of the wall.

The frame is set so as to give a four-inch reveal. The inner two-thirds of the opening is spanned by a timber lintel over which is turned a relieving arch of brick. Relieving arches usually consist of one rowlock arch for each eighteen inches or fraction thereof in the width of the masonry opening.

The inside blinds fold back in a pocket or box which is allowed to project into the room, rather than be made flush with the plaster wall. To make it flush would necessitate considerable furring of those walls of the room in which the windows occur and a consequent decrease in the size of the room. We are presuming in this case that it is desired to utilize all the space available for the room, and have consequently provided only the ordinary furring of one-inch by two-inch strips laid flatwise, and have allowed the blind box to project beyond the face of the plaster, treating it architecturally and making a feature of what is too frequently, from lack of a little forethought, an eyesore.

The open space under the window stool we have used to place a radiator and in the panel back we have placed a register through which the heat passes.

Fig. 144 is a section taken through the head of the window. The inside of the head has a wide soffit and a moulded entablature.

Fig. 145 is a section taken through the jamb of the window. When the blinds are folded back in the pocket, it has the appearance of a wide paneled jamb, owing to the fact that the first fold of the

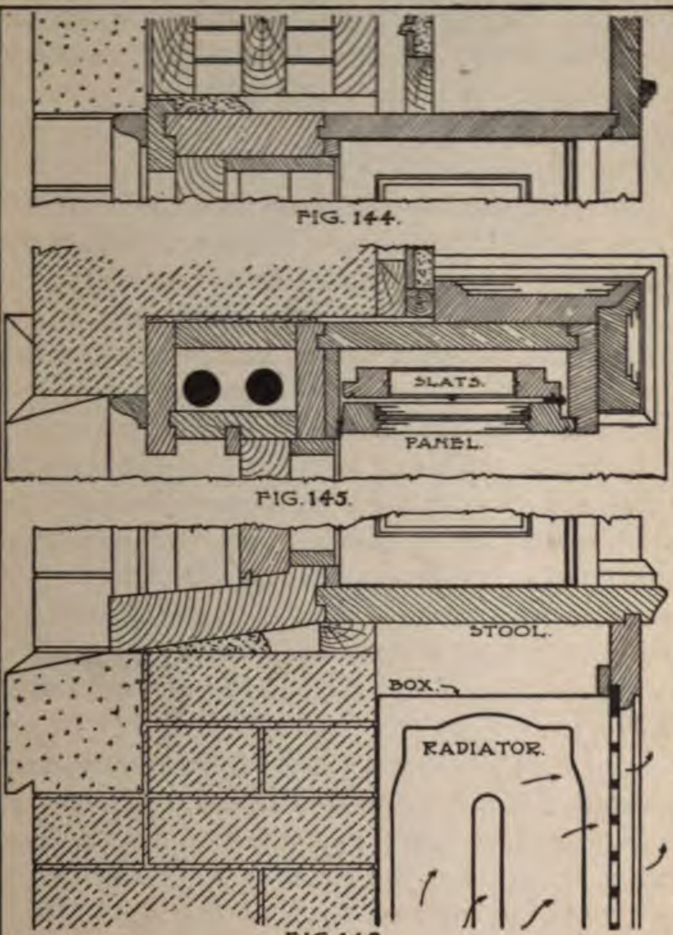


FIG. 144.

FIG. 145.

FIG. 146.

PLATE XXIX

WINDOWS.

blinds has a panel instead of rolling slats. The second fold, however, has slats. The exposed faces of the box are covered with paneled pilasters which finish with a small base on the top of stool.

Fig. 146 is a section taken through the sill of the window, which finishes on the inside with a wide stool with a moulded edge. Edge should be returned against the wall at ends.

## Placing Radiators

Advantage is taken of the open spaces under the stools to hide the radiators, which are more or less unsightly. For direct radiation, the radiator is simply placed within the box and a register provided in the face of the panel back, through which the heat passes.

A much better method of heating, when it is possible to place the radiators in the position described, is known as semi-direct heating and consists of the introduction of fresh air, from without the house, to the base of the radiator, from which point it passes up through the sections of the radiator, warming as it goes up, and out through the register to the room. The advantage of this method is that it provides ventilation for the room and supplies it with fresh warm air for heating; whereas, with the direct radiation, no ventilation is provided and the air that is warmed is that which is already within the room, and in most cases it is not very fresh.

A cast iron register, about the size of a brick, is provided in the face of the wall and connected with the base of the radiator by means of a small galvanized iron duct. The fresh cold air from outside the house enters through this passage and is controlled by means of a damper within the duct.

In severely cold weather the damper may be closed entirely and the radiator used for direct radiation.

When radiators are boxed in as shown, they should be set within a galvanized iron box, or the stool, panel back and other surrounding woodwork should be lined with galvanized iron as a protection against fire.

Frequently the radiator is placed under the window stool, but not boxed in. In such a case the inside of the brick wall below the stool is furred and plastered two coats, scratch and brown, and a panel back provided immediately in front of plaster and behind the radiator. The stool, which is wide, is supported on two wooden brackets, one under each pilaster, and about the same width as pilaster. This, however, is only for direct radiation. The underside of the stool should be covered with galvanized iron. The radiator, which is exposed in the room, should be neatly finished.

**A double hung sash window in a brick wall, with inside blinds folding in a slanting box.**

The brick wall is thirteen inches thick and the opening is spanned on top by a stone lintel four inches deep, eight inches longer than the width of the opening, and four brick courses in height. Back of the lintel, the inner two-thirds of the wall is carried across the opening on a rowlock arch turned over a wood center. Rowlock arches are usually made with one rowlock for each eighteen inches or fraction thereof, in the width of the opening, and are segmental in form with a one-inch rise for each foot of span. Key bricks of the lower rowlocks should not be set until the arch is ready for the key bricks of the top rowlocks. The centers for the arches are usually set by the carpenter under the direction of the mason. Temporary centers for face arches, should not be struck until the mortar with which arches are laid, has thoroughly set and hardened.

The window frame is set so as to give a four-inch reveal. The joint between the brick jamb or lintel and the wood frame is covered with a moulded staff head nailed to the frame. This staff head should be moulded in such a manner as will give a channel or deep recess on the side adjoining the brickwork

The opening on the exterior has a stone sill two brick courses in height, eight inches longer than the width of the opening, and of a proper depth to extend under the wood sill at least two inches. The stone sill is cut with a wash and has raised lugs or stools at each end to receive the brick jambs or imposts. The underside of projecting portion is cut with a water nose or drip. The sill should be bedded in mortar at each end under the imposts but should not be bedded in the center, as any settlement of the building would be likely to crack it if bedded. When building is nearly completed, the open space or joint under the sill should be pointed up with mortar, worked well into the joint.

The inside blinds fold back in a pocket or box, set on a slant, giving the appearance of a deep, paneled, splayed jamb. The first fold of the blinds is paneled and the inside soffit has a panel to correspond with it. The blind box projects into the room, with the trim returned about box to plaster wall. The head is formed like an entablature, with a crown moulding, a facia and a mould planted on facia. The stool is deep, carried across opening, and returned about box to plaster wall. The stool is supported at each end, under the trim, on carved wood brackets. The joint between the plaster and the underside of the wood stool is covered with a small cored mould which breaks around the wood brackets and returns against wall. The blind box projects into the room, with the trim finish as the other woodwork of the room in which it occurs. This is also true of the inside stop head.

Fig. 147 is a section taken through the head of the window. The panel shown in the inside soffit should be arranged so as to be easily removable in case of splitting or warping. This may be readily done, if constructed as indicated, by removing the small coved wood moulds which hold it in position. These moulds should be fastened to the frame rather than to the panel. In this way the panel is set free so that it may contract or expand without affecting adjacent work.

Fig. 148 is a section taken through the jamb of the window. The second and third folds of the blinds are provided with rolling slats. The first fold may also be provided with slats, but a panel makes a better appearance and does not catch

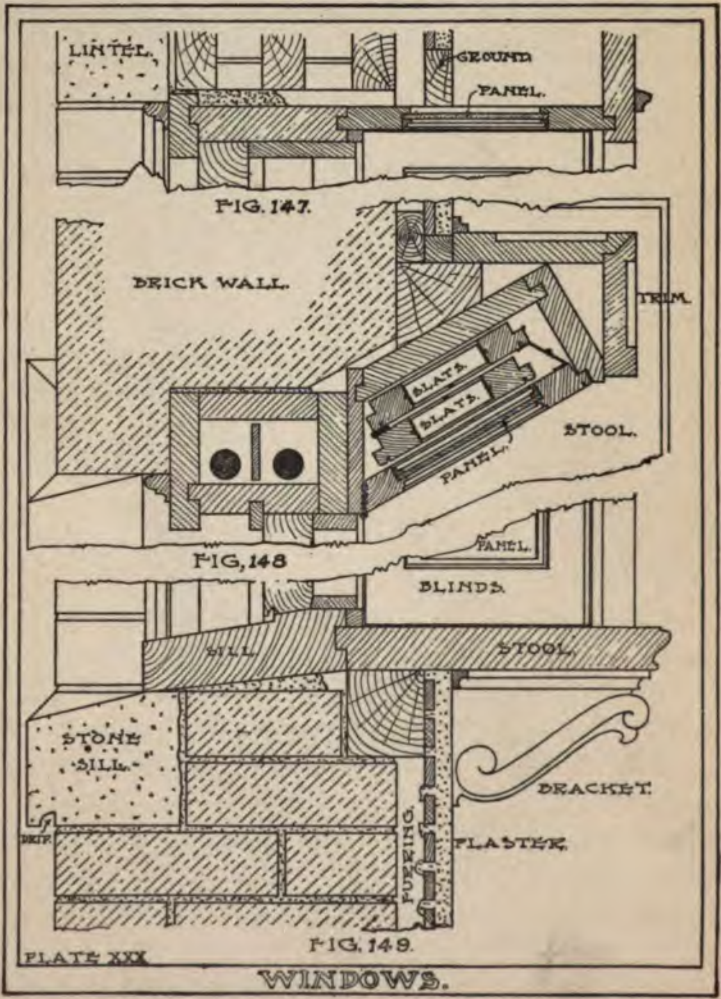


PLATE XXX

WINDOWS.

dust the way the slats would. It will be observed that a special hinge is used on the blinds, which prevents them from catching or sticking in the box. All the blind stiles should be rabeted as shown and should have a head on edge to lessen the prominence of the joint. The first fold is rabeted over the side of the box which acts as a blind stop. The use of the tongue dividing the weight box is a feature used only in the best grade work.

All interstices and spaces between the window frame and the masonry opening should be made absolutely wind proof. In ordinary work this caulking is done by caulking the spaces with oakum and pointing up with mortar.

Fig. 149 is a section taken through the sill of the window. The wood sill is ploughed for the inside stool. The space under the projecting stool is an excellent place for a radiator. If one is put there, the underside of the stool should be covered with asbestos paper and tinned.

**Plate XXXI illustrates windows in both frame and brick walls with inside blinds projecting in the room and folding back flat against wall.**

Fig. 150 illustrates the window in the frame wall. This wall is constructed of two-inch by five-inch studs set sixteen inches on centers. Studs are doubled about window and door openings and are doubled for the head and sill of each window and the head of each door. One row of herringbone crossbridging is provided between the studs for each story.

The outside of the framework is covered with one-inch by eight-inch matched or ship-lapped hemlock or North Carolina boards. These boards should be laid diagonally in preference to horizontally as they make a more rigid wall when so laid.

This sheathing is covered with a heavy tarred or rosin sized building paper, well lapped at all joints and well turned in at all corners and angles.

The exposed covering of the exterior of the wall consists of shingles laid five inches to the weather with broken joints and of random widths. Shingles over six inches wide should be split. Shingles should be well nailed with two galvanized nails to each one.

The inside of the wall is plastered on wooden lath and grounds are nailed to the studs to form a gauge for plastering and to give a nailing for the trim. The strip on which the studs are hung should be of the same material and finish as the adjoining trim. The inside stop head also serves the purpose of a blind stop.

The blinds are hung on a special hinge as shown, which permits them to be folded back against the wall, clear of the trim.

This manner of folding the blinds is not quite so good as the methods given in previous pages, as the blinds are rather unsightly and are great dust catchers. This method, however, is resorted to quite frequently owing to lack of space for a blind box.

The window frame is known as a box frame and the space between the box and the stud is either filled with "scratch" mortar or caulked with oakum, so as to make it wind proof.

Fig. 151 shows the same construction adapted to a masonry wall. The window frame is set so as

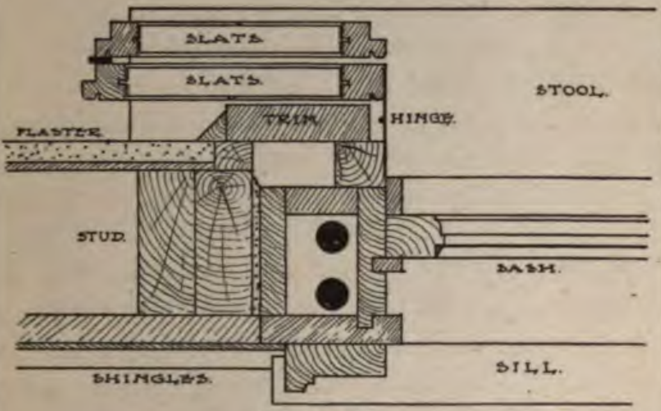


FIG. 150

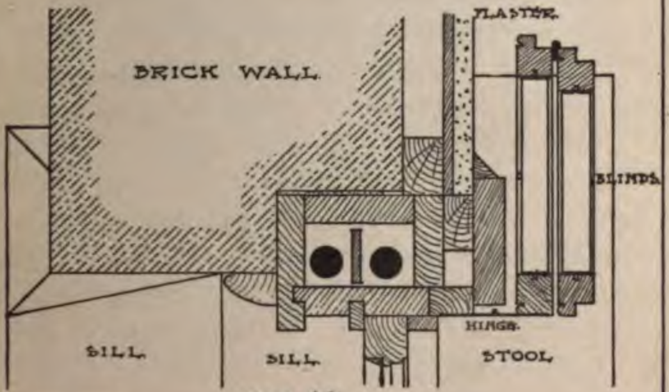


PLATE XXXI FIG. 151

WINDOWS.

to give an eight-inch reveal. The masonry jamb is rebated for the frame and the joint of the frame with brickwork is covered with a moulded staff bead.

The construction of the heads and sills is about the same as in previous window frame illustrations.

The wall is of brick, thirteen inches thick and the opening is spanned on top by a stone lintel or a brick face arch, back of which is turned rowlock relieving arch over a wood lintel or center.

The sill is of stone cut with a wash and has raised lugs or stools to receive the brick impost or jamb. The sill is usually two brick corners in height, eight inches longer than the width of the brick window opening, and is of a proper depth to extend under the wood sill at least two inches. The projecting portion of sill has a water nose or drip cut on the underside. The sill when first set should have mortar placed only under the ends which receive the brick imposts. The portion of the sill spanning the opening should be kept free from mortar until the building is topped out, as the settlement, which inevitably occurs, would be likely to crack the sill if bedded in mortar under the center. The open joint, however, should be well pointed up after the settlement has taken place

**Construction of the casement window opening outward.** We illustrate first a double casement in a frame wall, with the sashes hinged at the side and opening outward, and with a stationary transom overhead.

The wall is constructed of two by four-inch studs, placed sixteen inches on centers and doubled for jambs, heads and sills of openings. It is covered on the outside with matched sheathing boards, heavy tarred felt and random with shingles. The inside is wood lathed and plastered three coats.

The frame is moulded and rebated as shown, and one and three-quarter inches thick. The sashes require heavier stiles and rails than the sashes for double hung windows do and in cases where it is desired that as little wood as possible shows, the sashes are made of cherry or other suitable hardwood and are reduced in size. The stiles and bottom rail of sashes, in addition to being rebated, have grooves cut in same as shown, so that any water which may beat its way in will run out through the grooves.

The sashes are shown glazed with double thick glass, bedded in putty, sprigged, and back-puttied. For large sashes or where plate glass is used wood beads or moldings are better than the putty for securing the glass in place.

The sill is rebated for the lower rail of sash and is ploughed for stool and shingles. All spaces about the frames are calked with oakum and pointed with "scratch" mortar.

The trim or architrave is molded and formed out of seven-eighths inch stuff, is blocked on the back and is provided with a back band and a neat wall mold. This wall mold being small may be bent to fit the slight unevenness of the plaster. The inside stop bead should be of the same material as the trim and similarly finished. In the better class of buildings the stop bead is secured in place by means of round head brass or bronze screws set in a sunken socket of brass or bronze, instead of being nailed in place. By this means the stop bead is easily removed without marring the wood or varnish or may be slightly shifted in or out, if the sash binds or rattles, by merely loosening the screw a little. Stop beads should never be less than one and three-quarter inches wide so that window shades may be set on same.

Fig. 152 is a section taken through the head of the window. The top of the outside casing is covered with tin turned down over the outer edge and neatly tacked, and extending up under the shingles or other exterior covering about six inches. A little wood fillet is placed over the cap as shown, to give the first course of shingles the required tilt.

Fig. 153 is a section taken through the jamb of the window. The block or furring strip which is shown nailed on to the side of the stud, is necessary as a nailing for the lath which cannot obtain a direct bearing and nailing on the stud, owing to the position of the ground to which the inside architrave is nailed.

Fig. 154 is a section taken through the sill of the window. As an additional precaution against rain, beating in under the lower rail of sash a molded water nose might be let into the rail on the outside or a groove might be cut on the underside of the rail near its outer edge.

Fig. 155 is an exterior elevation of the window and the dotted lines with the numbers indicate the cuts from which the sections illustrated are taken.

Fig. 156 is a horizontal section taken through

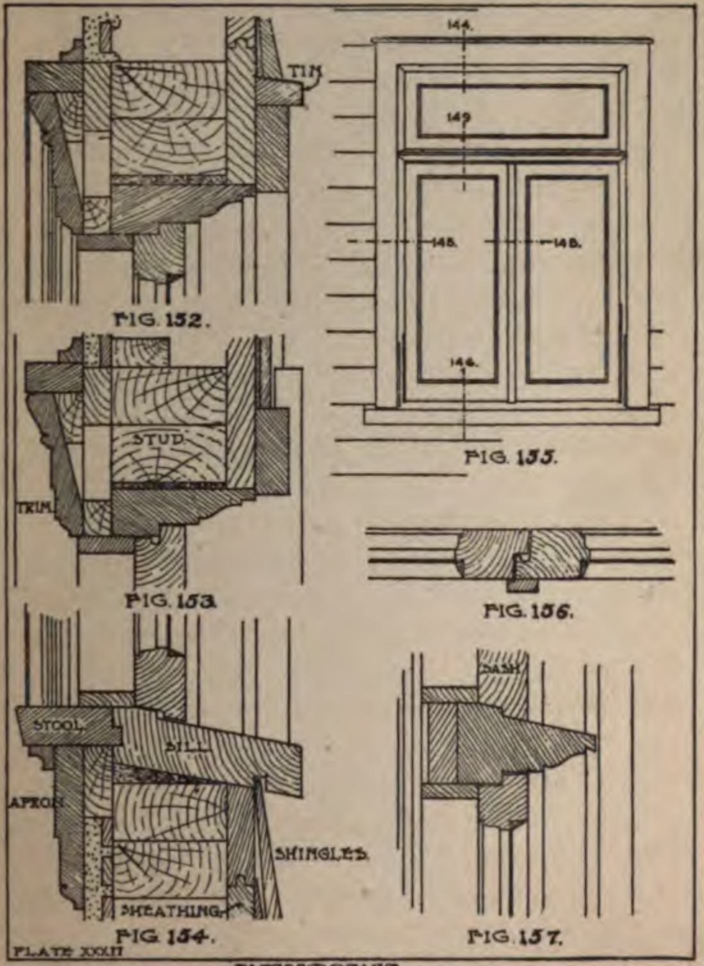


FIG. 152.

FIG. 153.

FIG. 154.

FIG. 155.

FIG. 156.

FIG. 157.

PLATE XXXII

WINDOWS.

the meeting stiles of the sash. The standing leaf is rebated and the inner edge is beaded. The other leaf is rebated and grooved and has a flat band or astragal planted on the outside to cover the joint of the meeting stiles. The groove in the stile catches any rain-water which may beat in, and carries it down to the sill. Note that there is a slight bevel to the joint of the meeting stiles to allow for the play of the sashes.

Fig. 157 is a section taken through the transom bar. The upper or transom sash is stationary and is rebated over the transom bar and the joint is made in whitelead. When the transom sash is hinged or pivoted a water nose or groove is usually provided on the lower rail of sash. The transom bar should have about the same pitch as the window sill so as to properly cast off the water, and the outer edge should have an undercut as shown to prevent dripping water from running down under head of frame and in over top of sash. The inside surface of the transom bar is paneled as shown and inside stop bead follows across same.

# Part II

COVERING OF ROOFS. Shingling over a hip-ridge — Method of shingling — Old-fashioned method shown — To cover a circular dome with horizontal boarding — To describe the covering of an ellipoidal dome — Simple iron bracket — Common shingling hatchet — Vertical section of circular dome

In slating or shingling a roof, great care should be taken at the hips, ridges and valleys. Where the roof is shingled, two or three courses should be left off at the ridge until the two sides are brought up, then the courses left off should be laid on together, and in such a manner as to have them lap over each other alternately. This can easily be done if the workman uses a little judgment in the matter; and a roof shingled in this manner will be perfectly rain-tight, without the ridge-boards or cresting. In valleys, the tin laid in should be sufficiently wide to run up the adjacent sides far enough to prevent back-flow from running over it. Ample space should be left in the gutter to permit the water to flow off freely. There is a general tendency to make these waterways too narrow, which is frequently the cause of the water backing up under the shingles, causing leakage and premature decay of the roof.

There are several methods of **shingling over a hip-ridge;** one is the old and well-tried method of shingling with the edges of the shingles so cut that the grain of the wood runs parallel with the line of the hip, as shown in Fig. 158. Here it will be seen that the shingles next to those on the hip have the grain running up and down at right angles with the eave. In Fig. 159 we show a front view of the same hip, which will give a better idea of what is meant by having the grain parallel with the line of hip. abcd show the cut of hip shingles and nnnn the common shingles.

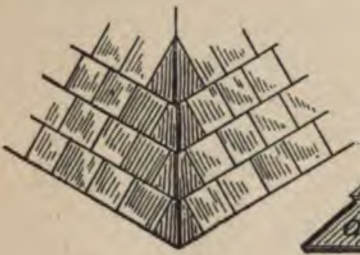


FIG. 158

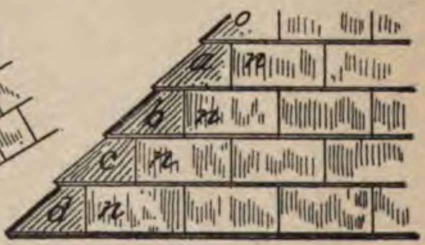


FIG. 159

The proper way to put in these shingles is to let the ends run over alternately and then dress them to the bevel of the opposite side of the roof; this is shown better at obd, where the edges of the shingles are shown that are laid on the other side of the roof, and are not seen in the drawing. Another method now frequently used is to cover the hip with strips of tin; this is used quite extensively and found to be one of the best methods in use.

### Method of Shingling.

There is an unwritten law that all carpenters know how to shingle—much better than they really do. Our observation has been that shingling is one of the most important matters in house construction. In the early days a house consisted of practically nothing but a roof to keep the rain out. And even to-day, no matter how well the foundation and floors are made, or how plumb and beautiful the walls are, or how well decorated on the inside, or how nice the roof was framed by one skilled in roof framing, or how well it was sheathed, it is practically worthless unless it is well shingled. There is no place like the roof for a carpenter to show his mechanical skill, for any one that can saw to a line and drive a nail can lay a floor, put on siding and put up inside finish.

We wish to impress on the mind of the young mechanic that no matter what part of the trade he is working at, it is of some importance, and there is always an opportunity to learn something.

Some old mechanics that have had twice as much experience in house building say nail as high as possible. They say the higher in the shingle you nail the more air will get to all parts of the shingle and it will last longer, which is undoubtedly true. Another with possibly even more experience will say nail just as low as possible and have the nail covered with the next course, and gives for his reason that high winds and heavy rain and snow storms will not drive in.

Some mechanics think there is nothing like a six-inch shingle for a roof, and point to what a nice roof is made of slate all of the same size. It is all right for slate, but in the opinion of some all wrong for wood shingles, for if one cracks, and near the center as they generally do, it makes a crack three courses long, and should a few more crack there are bound to be bad leaks in the roof.

Fig. 160 shows three courses of shingles being laid on the roof to three chalk lines, and you will notice that not a single joint comes over another, not even from the first to the fourth courses, so if one should split right at another joint it only makes a crack less than two-thirds the length of a shingle. By driving the nails one a little above the other they are not as liable to crack as if they were right opposite each other.

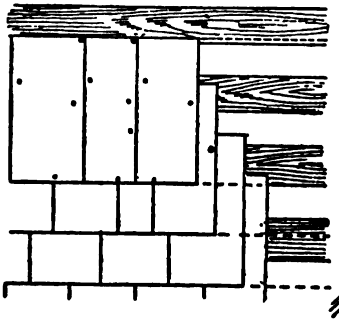


FIG. 160

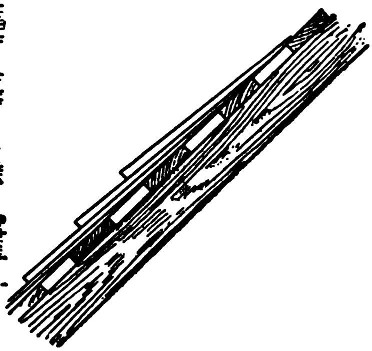


FIG. 161

Fig. 161 is an end view and shows that not only is there practically three courses on all parts of a roof, but a good part of the fourth should be there also.

Fig. 162 shows an old-fashioned way, and when we got so high we had to get a new rest for our feet we nailed brackets on the roof with tenpenny nails, and put a plank on them. Fig. 163 shows a more modern way and how it is done. It is now the most common way, and does not make a leak, as the tenpenny nails would, although sometimes a shingle nail makes a hole. To avoid that, drive the shingle nail below where the nails were driven in the roof when you take it down, and it makes the holes break joints.

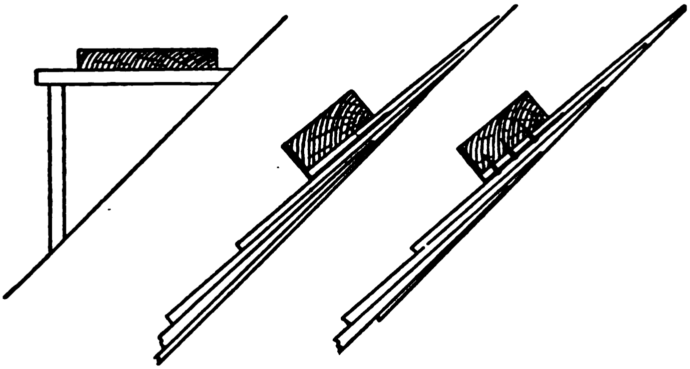


FIG. 162 FIG. 163 FIG. 164

Some carpenters to avoid the danger of leak just mentioned, put the shingle on tip end up, shingle it in, and then saw it off when the scaffold is taken down. Others shingle over it and drive it out with a hand ax.

Fig. 164 shows a very simple iron bracket, which has many good points, but there is nothing quite as handy and cheap as the shingle.

Fig. 165 is a very common shingling hatchet. File marks at one and one-half and two inches (the projection that is generally on a barn or shed roof—as most houses nowadays have gutters) and other marks at four and one-half and five inches (which are ordinary courses), and it makes a very convenient all-around rule, hammer and hatchet, and in the hands of a mechanic a very good roof can be laid even without the aid of chalk lines or straight edge.

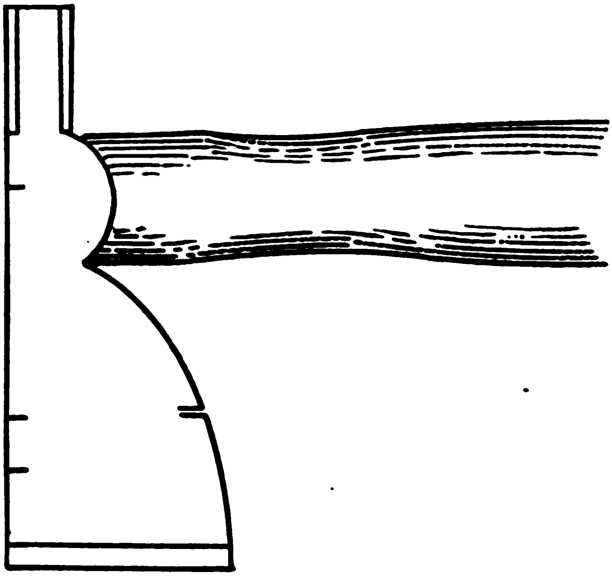


FIG. 165

**To cover a circular dome with horizontal boarding**, proceed as follows:

Let ABC (Fig. 166) be a vertical section through the axis of a circular dome, and let it be required to cover this dome horizontally. Bisect the base in the point D, and draw DBE perpendicular to AC, cutting the circumference in B. Now divide the arc BC into equal parts, so that each part will be rather less than the width of a board, and join the points of division by straight lines, which will form an inscribed polygon of so

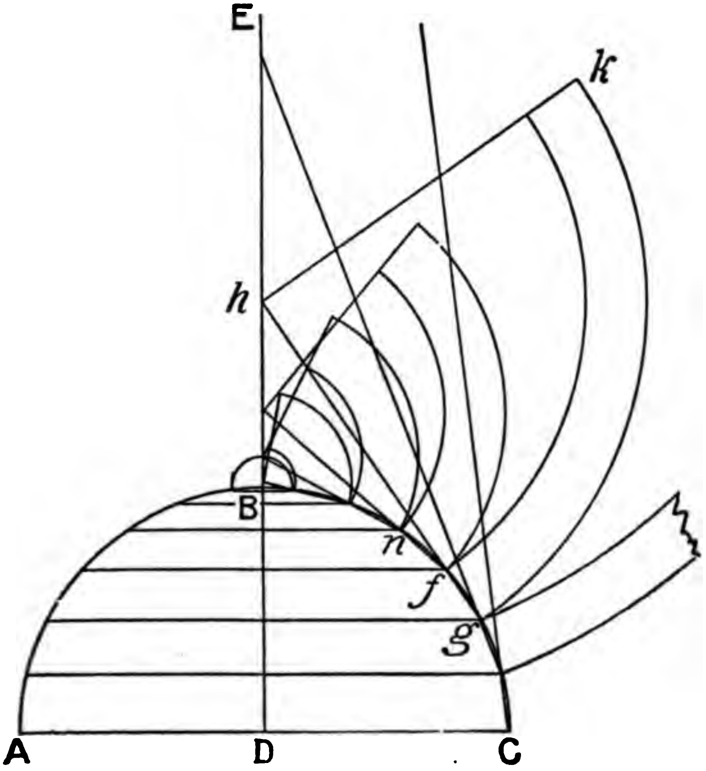


FIG. 166

many sides; and through these points draw lines parallel to the base AC, meeting the opposite sides of the circumference. The trapezoids formed by the sides of the polygon and the horizontal lines, may then be regarded as the sections of so many frustums of cones; whence results the following mode of procedure: Produce, until they meet the line DE, the lines nf, fg, etc., forming the sides of the polygon. Then to describe a board which corresponds to the surface of one of the zones, as fg, of which the trapezoid is a section, from the point h where the line fg produced meets DE, with the radii hf, hg, describe two arcs, and cut off the end of the board k on the line of a radius hk. The other boards are described in the same manner.

**To describe the covering of an ellipsoidal dome** with boards of equal width.

Let ABCD (No. 1, Fig. 167) be the plan of the dome, ABC (No. 2) the section on its major axis, and LMN (No. 3) the section on its minor axis. Draw the circumscribing parallelogram of the ellipse FGHK (No. 1), and its diagonals FHGK. In No. 2, divide the circumference into equal parts, 1234, representing the number of covering boards, and through the points of division 18, 27, etc., draw lines parallel to AC. Through the points of division draw 1p, 2t, 3x, etc., perpendicular to AC, cutting the diagonals of the circumscribing parallelogram of the ellipse (No. 1), and meeting its major axis in ptx, etc. Complete the parallelograms, and their inscribed ellipses corresponding to the lines of the covering, as in the figure. Pro-

**duce the** sides of the parallelograms to intersect **the circumference** of the section of the transverse

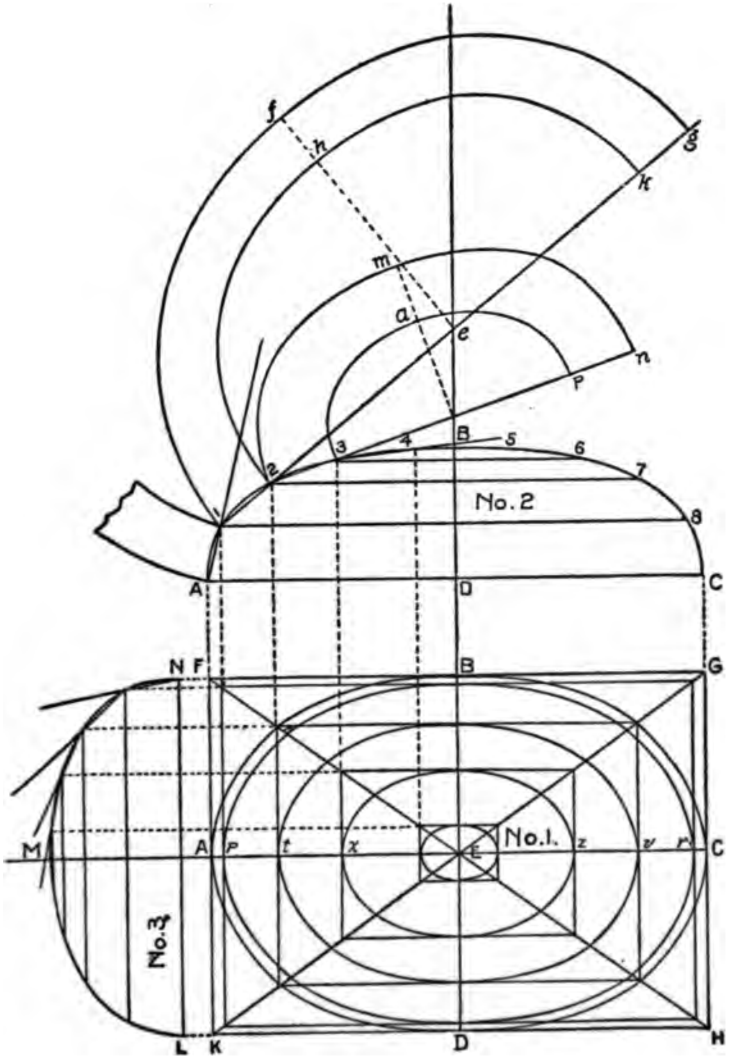


FIG. 167

axis of the ellipse in 1234, and lines drawn through these, parallel to LN, will give the representation of the covering boards in that section. To find the development of the covering, produce the axis DB, in No. 2, indefinitely. Join by a straight line the divisions 12 in the circumference, and produce the line to meet the axis produced; and 12ekg will be the axis major of the concentric ellipses of the covering lfg, 2hk. Join also the corresponding divisions in the circumference of the section on the minor axis, and produce the line to meet the axis produced; and the length of this line will be the axis minor of the ellipses of the covering boards.

Before leaving the subject of roofs, it may be as well to remark that the framing of valley roofs is so very much like that of hip-roofs, that it is not necessary to make special drawings for the purposes of showing how a valley roof is constructed or laid out. The cuts, bevels, lengths and positions of rafters and jacks may be easily found if the same principles that govern hip-roofs are followed, as a valley rafter is simply a hip reversed.

# Part III

MOULDINGS. Roman mouldings — Ovals, or quarter round — Torus, or half round — Cavetto, or hollow — Cyma Recta — Cyma Reversa — Scotia — Fillet — Apophyge — Astragal — Bead — Mitering mouldings — Cutting of a spring moulding when the horizontal portion has to miter with a gable or raking moulding — Obtaining the section of a raking mould that will intersect a given horizontal moulding — Descriptive geometry — Lines for the cuts in a miter box — Finding proportions of a small moulding — To obtain correct cut of a veneer — To get the contour or outline for a raking moulding, Etc.

Mouldings are classed as Roman, Grecian, and Gothic.

The **Roman mouldings** are all formed of parts of circles, and can therefore be struck with compasses. The Grecian are principally composed of parts of curves known as the conic sections—such as the ellipse or hpyerbola. They are otherwise nearly similar to the Roman, which are therefore illustrated in this place as being the simpler and the more generally used.

Fig. 168. The moulding of which this is a section is called the **Ovolo, or quarter round.** The fillet, or straight edge projecting beyond the curved portion, is to be drawn first, and then the horizontal, which represents the depth or bottom line of the moulding. Now produce the bottom line of the fillet, and on it, from the point at which the curve is to start, mark off the width of the moulding. This point, marked O in the cut, is the center from which the quadrant is to be struck.

Fig. 169 is called the **Torus, or half-round.** Having drawn the fillet, and the line representing the bottom of the moulding, draw a line at right angles to these. Bisect the width of the curved part, and the bisecting point will be the center.

Fig. 170 is the **Cavetto, or hollow.** This is a quarter-round, the curve turning inward. It is thus precisely the reverse of the ovolo.

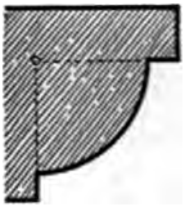


FIG. 168

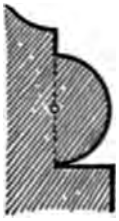


FIG. 169

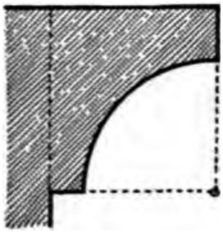


FIG. 170

Fig. 171 is a section of the moulding called the **Cyma Recta.** The exact form of this moulding is to a certain extent a matter of taste, since the curve may be made more or less full, as shown in the three examples, Figs. 171, 172, and 173. To describe Fig. 171, draw a perpendicular across the depth of the moulding, and bisect it. From the bisecting point as a center point describe a quadrant; through the center draw a horizontal line, and from the point where the quadrant already drawn touches this line mark off the radius; then from this point as a center describe the second quadrant, which will complete the form. In this and subsequent curves of combined arcs the greatest care is necessary, so that the one may glide smoothly into the other without showing any break or thickening at the joining. To describe the Cyma Recta shown in Fig. 172, which is the form most generally used, let n and o be the points to be united by the moulding. Draw the line n o, and bisect it; with half n o as a base describe an equilateral triangle on the opposite sides of the line; then the apices of the triangle will be the centers from which the curves are to be struck.

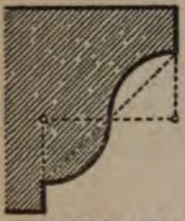


FIG. 171

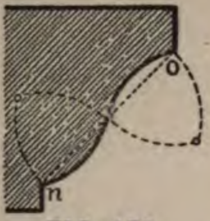


FIG. 172

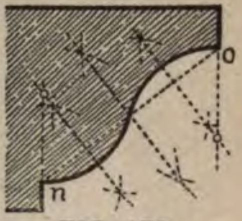


FIG. 173

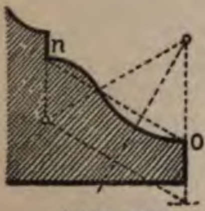


FIG. 174

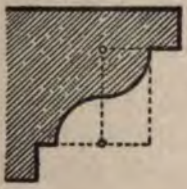


FIG. 175

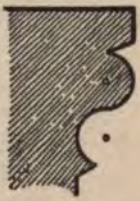


FIG. 176

To describe Fig. 173, or others the curves of which are required to be more flat than in the last figure, draw the line n o as before, and bisect it. Bisect these two divisions again, and the centers will be on these bisecting lines, according to the form required; for, of course, the longer the radius the flatter the curve will be.

If it is required that the curve should be more full at the lower than at the upper part, it may be effected in the following manner, which is shown in Fig. 174: Having drawn n o, divide it into three equal parts; construct an equilateral triangle, the base of which is two of these thirds, and on the opposite side of the line another, the base of which is the remaining third. The apices of these triangles will be the centers for the curves.

Fig. 175 is the **Cyma Reversa.** In this moulding the curve bulges outward at its upper part, its fulness being regulated by the taste of the designer.

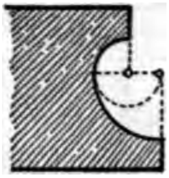


FIG. 177

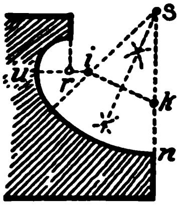


FIG. 178

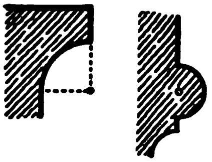


FIG. 179

Thus it may be formed of two quadrants as in Fig. 175; or of two semicircles, as in Fig. 176; or it may consist of the two arcs drawn from the apices of triangles as in the cyma recta already shown.

Fig. 177 is the **Scotia.** This is the hollow moulding, sometimes consisting of a semicircle only: viz., the reverse of the torus. In other instances as in Fig. 177, it is composed of two quadrants; and in others it is drawn from three centers, as in Fig. 178. To draw this, divide the depth of the moulding into three equal parts, and with one-third describe the quadrant r u; produce the horizontal r u, and from r set off i, equal to half u r. At n erect a perpendicular, and mark on it n k, equal to i u; draw i k, and bisect it: produce the bisecting line until it cuts n k in s. Draw s i and produce it. From i, with radius i u, draw the next portion of the curve, meeting s i produced; then complete the curve by an arc drawn from s with radius s n.

A **fillet** is the small flat edging used to separate two larger mouldings, to strengthen their edges, or to form a cap or crowning to a moulding. The fillet is one of the smallest members used in cornices, architraves, bases, and pedestals. When placed against the flat surface of a pedestal, it is usually joined to it by a small quarter-round hollow called the **Apophyge** (Fig. 179).

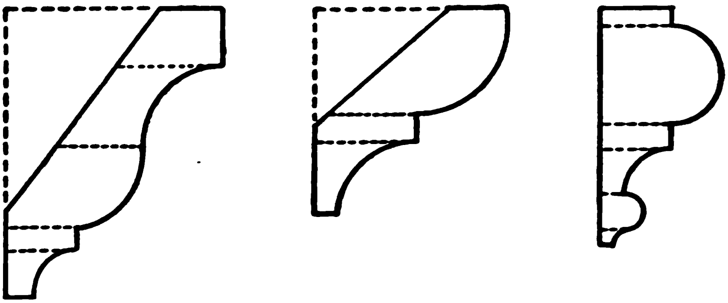


FIG. 180

The **torus**, when worked very small, is called the **Astragal** (Fig. 180); but when worked so as not to project, as on the edge of boards to be joined, it is called a **bead**.

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## Mitering Moudings.

One of the most troublesome things the carpenter meets with is the cutting of a spring moulding when the horizontal portion has to mitre with a gable or raking moulding. Undoubtedly the best way to make good work of these mouldings is to use a mitre box. To do this make the down cuts, B,B (Fig. 181), the same pitch as the plumb cut on the rake. The over cuts O,O,O,O should be obtained as follows: Suppose the roof to be a

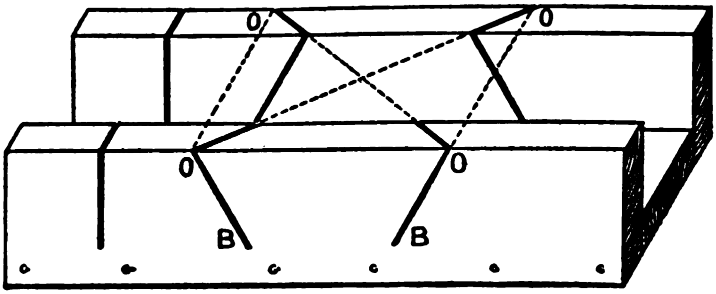


FIG. 181

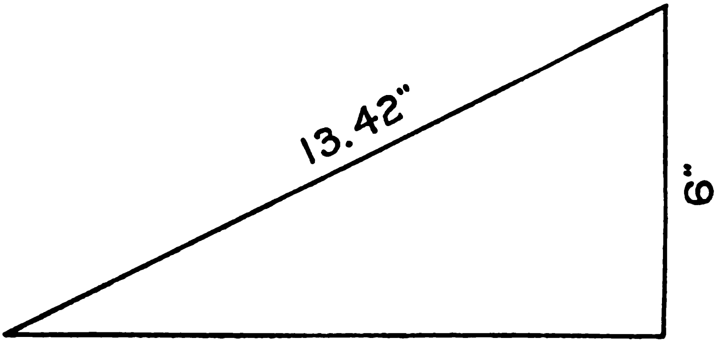


FIG. 182

quarter pitch—though the rule works for any pitch when followed as here laid down—we set up one foot of the rafter, as at Fig. 182, raising it up 6 inches, which gives it an inclination of quarter pitch; then the diagonal will be nearly 13½ inches. Now draw a right-angled triangle whose two sides forming the right angle, measure respectively 12 and 13½ inches, as shown in Fig. 183.

The lines A and B show the top of the mitre box with the lines marked on. The side marked 13½ inches is the side to mark from; this must be borne in mind, and it must be remembered that this bevel must be used for both cuts, the 12-inch side not being used at all.

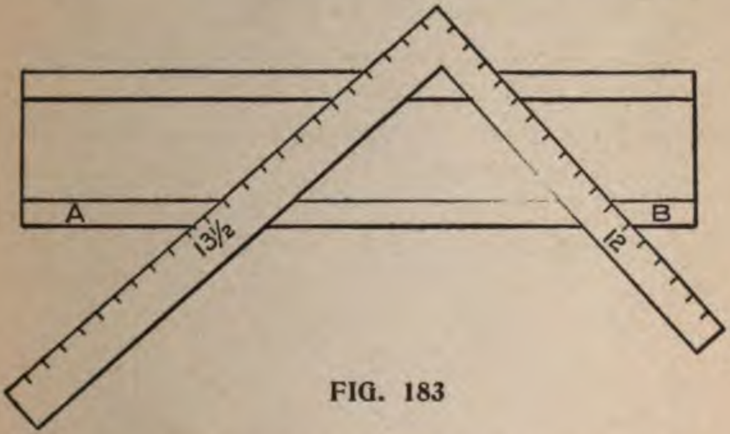


FIG. 183

Another excellent method for **obtaining the section of a raking mould that will intersect a given horizontal moulding**, is given below, also a manner of finding the cuts for a miter box for same. The principles on which the method is based being, first, that similar points on the rake and horizontal parts of a cornice are equally distant from vertical planes represented by the walls of a building; and, second, that such similar points are equally distant from the plane of the roof. Representing the wall

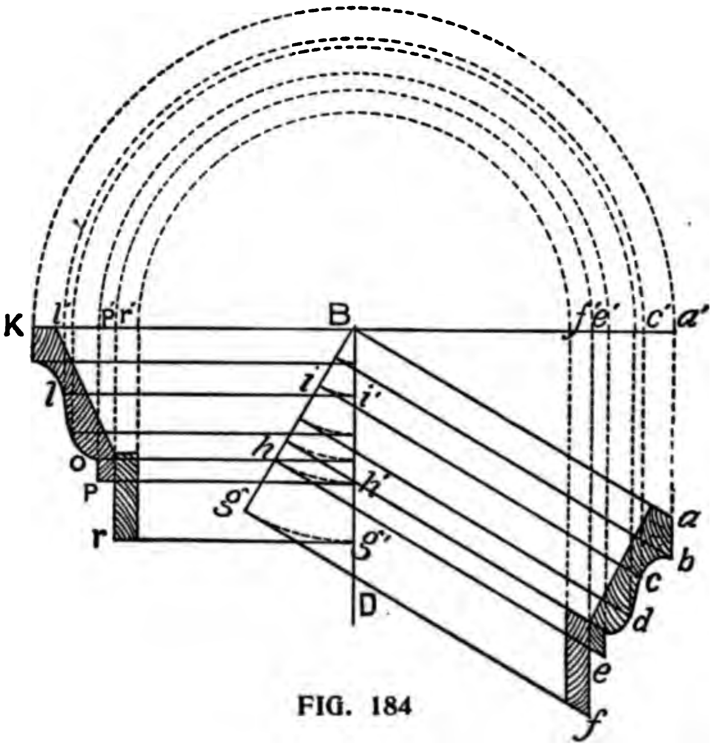


FIG. 184

faces of a building by the line DB (Fig 184), and a section of the horizontal cornice by DBabcdef–Bab being the angle of the roof pitch, draw line aa′, cc′, ff′, parallel to DB and intersecting the line ka′, which is drawn at right angles to DB through the point B; then, with B as a center, describe the arcs a′k, c′l′, etc., intersecting the same line ka′ on the opposite side of DB. This gives the point k at the same distance from DB as the points a and a′, and the line ll′ at the same distance as cc′. The rest of the same group of parallel lines are found to be similarly situated with respect to DB.

From **Descriptive Geometry** we have the principle, that if we have given two intersecting lines contained in a plane, we know the position of that

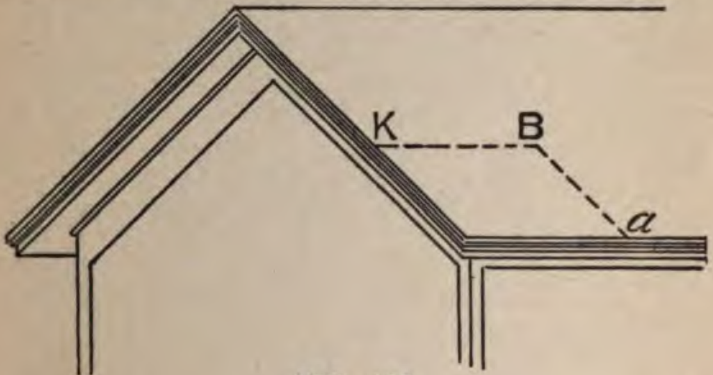


FIG. 185

plane, hence we may represent the plane of a roof by the line Ba and Bk (Figs. 184 and 185); and since it will be most convenient to measure the distances required in a direction perpendicular to that plane, in following out the principle draw lines from the points cef, etc., parallel to Ba and intersecting the line Bg, which is made prpendicular to Ba. This gives us on Bg the perpendicular distance of the points cef, etc., from the line Ba. From the intersection of these lines with Bg, and with B as a center, describe arcs intersecting the line DB at i′h′g′, etc.; from these intersections with DB draw lines l′l, h′p, g′r, etc., parallel to Bk, until they intersect the first group of lines drawn perpendicular to Bk, and the intersection of each set of two lines drawn from the same point on the horizontal section will give the similar point of the rake section. Taking the point l, for example, we have, as before proved, l at the same distance from DB as c, and i being at the same distance from Ba as c, Bi being equal to Bi′, and Bi′ equal to ll′, ll′ is equal to Bi′; and consequently l is the same distance from Ba, which is in accordance with principle already shown. The intersection of each set of lines being found and marked by a point, the contour of the moulding may be sketched in, and the rake moulding, of which the section is thus found, will intersect the given horizontal moulding, if proper care has been taken in executing the diagram.

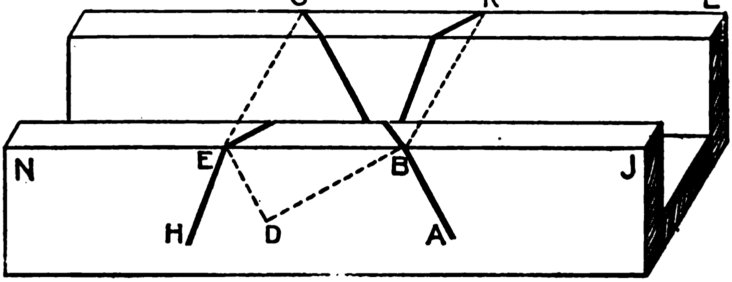


FIG. 186

Fig. 186 shows **how to find the miter cut for the rake moulding,** the cut for the horizontal one being the same as for any ordinary moulding. Take an ordinary plain miter-box, NJL, and draw the line AB, making the angle ABJ equal to the pitch angle of the roof. Draw BD perpendicular to AB, and extend lines from B and E square across the box to K and C; join BC and EK. ABC will be the miter cut for two of the rake angles; HEK will be the cut for the other two angles, the angle HEN being equal to the angle ABJ. In mitering, being horizontal and rake moulding, that part of the moulding which is vertical when in its place on the cornice, must be placed against the side of the box.

**Lines for the cuts in a miter box,** for joining spring mouldings, may be obtained as follows: If we take BS (Fig. 187), the moulding showing the spring or lean of the member, and DE the miter required, then proceed as follows: With A as a center, and the radius AG, describe the semicircle FHGC; then drop perpendiculars from the line FC, at the points F, A, H, G, and C, cutting the miter line as shown at the line ID. Draw IE parallel to FC, then from I draw IS, which will be the bevel for the side of the box, and the bevel CR will be the line across the top of the box. The miter line, as shown here, is for an octagon, but the system is applicable to any figure from a triangle or rectangle to a polygon with any number of sides.

Fig. 188 shows the manner of **finding proportions of a small moulding** which is required to miter with a larger one, or vice versa. Let AB be the width of the larger moulding, and AD the width of the smaller one; construct with these dimensions the parallelogram ABCD, and draw its diagonal AC. Let AB be the section of the moulding which we wish to reduce to member with a moulding the width of AD. Draw any number of parallel lines to BC cutting the line AC, from which points draw lines parallel to DC and beyond the line AD. From the latter set off the thickness of the moulding on the corresponding lines as 1–2 will give the contour of the mould for the lesser width or vice versa.

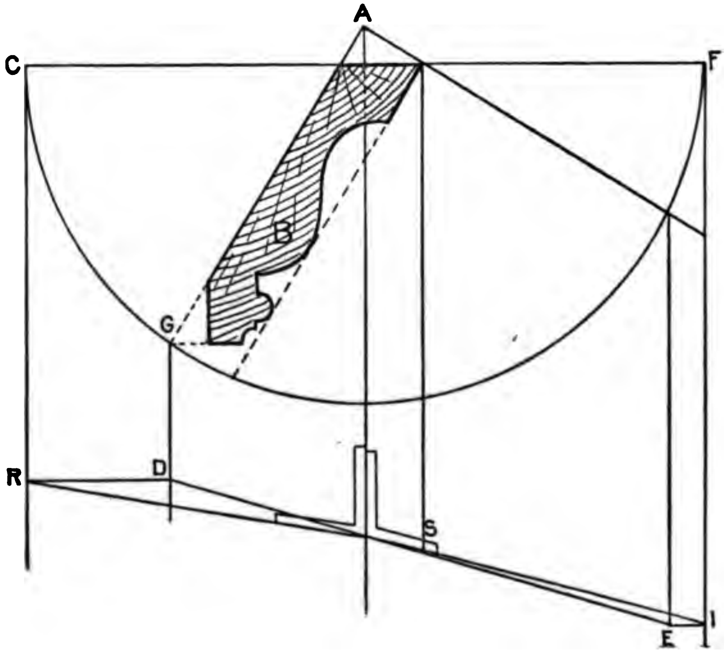


FIG. 187

**To Obtain Correct Shape of a Veneer.** Fig. 189 exhibits a method of obtaining the correct shape of a veneer for covering the splayed head of a gothic jamb. E shows the horizontal sill, ef the splay, FA the line of the inside of jamb, o the difference between front and back edges of jamb,

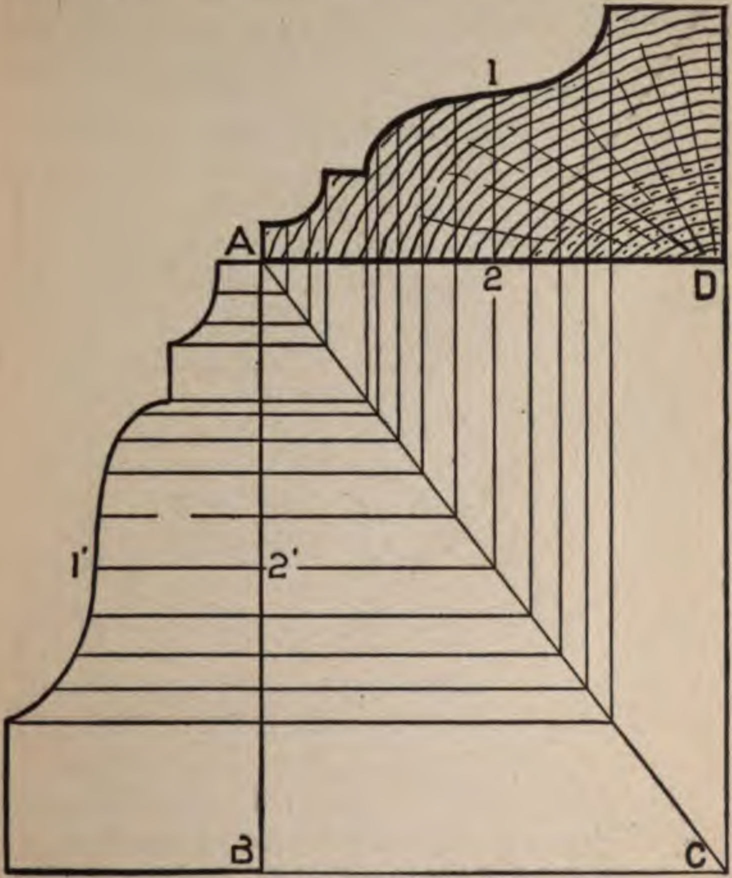


FIG. 188

BA the line of splay. At the point of junction of the lines BA, FA, set one point of the compasses, and with the radius AB draw the outside curve of n; then with the radius AS draw the inside curve,

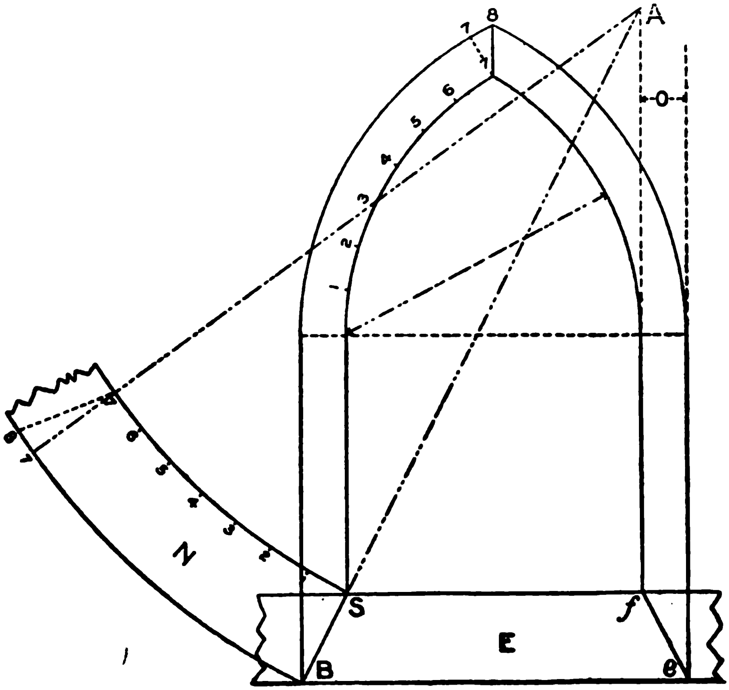


FIG. 189

and n will be the veneer required. This will give the required shape for either side of the head.

**To get the contour or outline for a raking moulding**, proceed as shown in Fig. 190. The horizontal moulding is divided into any number of parts, equal or unequal, as shown at abcdefg. The line AC shows the rake or inclination. Draw lines parallel with AC, from a to D, b to v, etc. Drop a line AB, perpendicular to AC, at any convenient point on the rake, make the distance AC equal to ho; then drop the lines pgrst, and where these lines cut the lines abcdefg, these points of contact will be in the curve line of the rake moulding, as at Dvwxyz. From these points trace the curve, which will be the proper shape for the moulding.

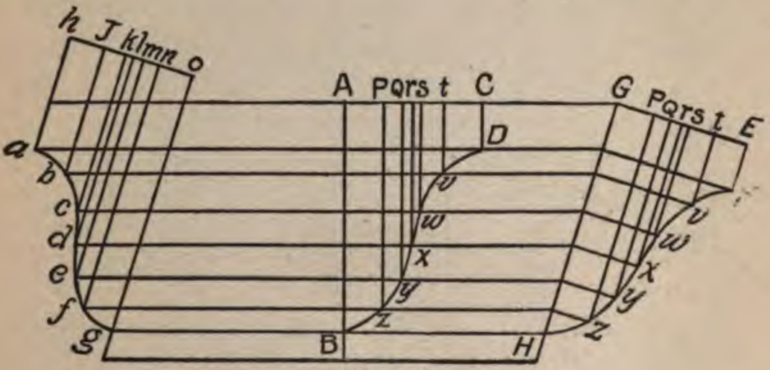


FIG. 190

The divisions and lines shown at GHEF give the proper shape for the moulding at the top return.

**To Cover a Circular Dome with Vertical Boarding.** The upper part of Fig. 191 represents the elevation of the dome, and the lower part represents the plan and the shape of the board in the stretch-out. Divide the diameter of the dome into spaces equal the width of the boards to be used. Divide one side of the elevation into any number of equal parts, as 1, 2, 3, etc., and from these points draw parallel lines down to the

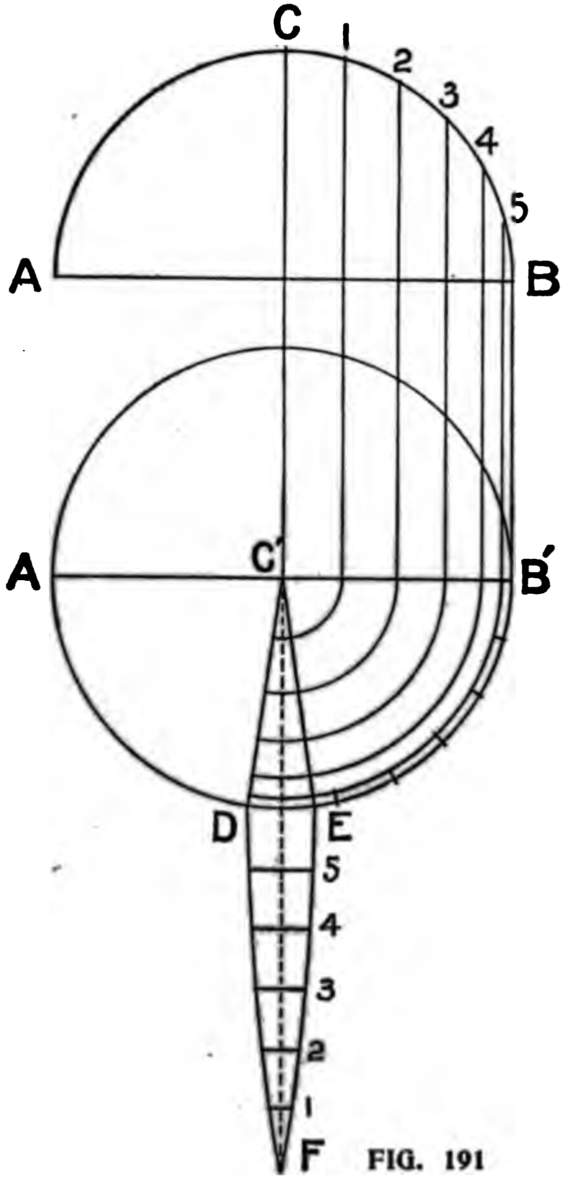


FIG. 191

diameter of the plan as at C″B″. From C″ as a center draw lines C″D″ and C″E which represents the board in its respective place on the dome. From C″ as center and with the points 1, 2, 3, etc., on the diameter swing around to C″D and C″E as shown; and on the line C″F lay off the distance 5, 4, 3, etc., which will be the correct length or stretch-put of the board. The length of the cross lines between C″D and C″E governs the length of the cross lines of the board. Care should be taken to not have the boards too wide, as the narrower the boards the better they will fit the dome.

Sometimes the workman will find it necessary **to miter in circles between two lines of mouldings,** and to do so the circular moulding must be made with a diameter large enough to have the solid

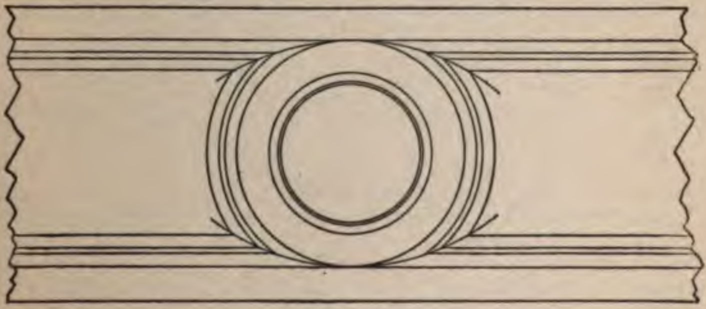


FIG. 192

wood adjoin the solid wood of the running mouldings, as shown at Fig. 192. It will be seen that the points of juncture of the various members of the mouldings do not run in a straight line, thus making the miter-joint a little curved, which admits of the mouldings working together accurately without requiring to be pared.

Figs. 193, 194, 195, and 196 show how various joints are made by the junction of circular mouldings and straight mouldings, and mouldings with more or less curvature.

A **spring moulding** is one that is made of thin stuff, and is leaned over to make the proper projection, as shown at Fig. 197. A shows the spring moulding; B the space left vacant by the leaning of the moulding. These mouldings are difficult to miter, more particularly so when the joint is made with a raking moulding that springs also. Some of the methods given for obtaining the cuts for

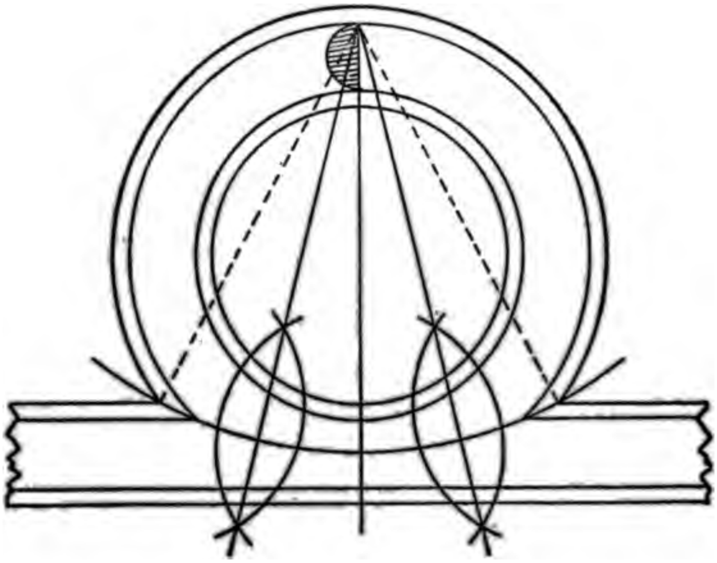


FIG. 193

raking mouldings may be used for cutting these mouldings when the work is straight, but when circular the application of other methods is sometimes necessary. Many times the workman will

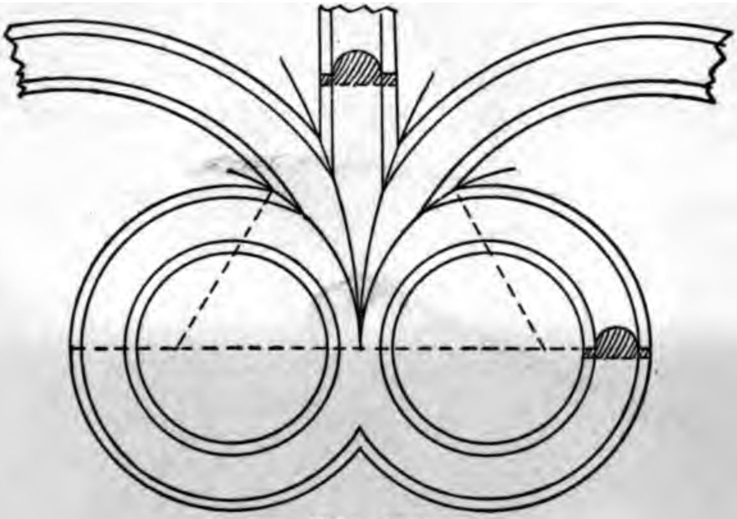


FIG. 194

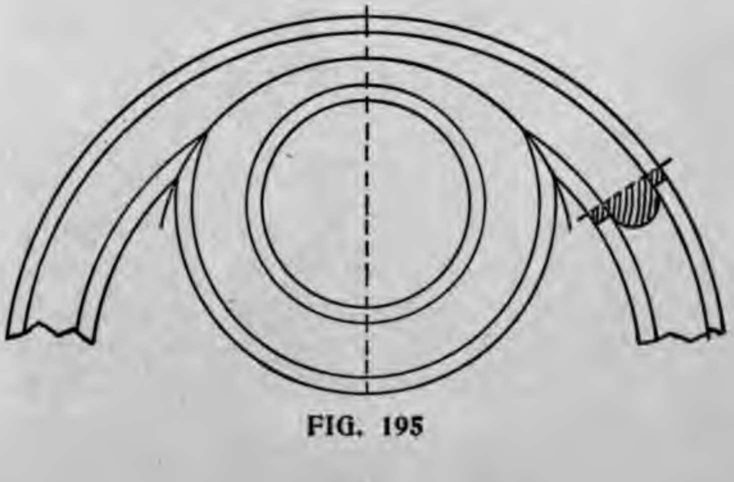


FIG. 195

come across very knotty operations of this kind to work out, and the following diagrams will then prove exceedingly useful: Fig. 198 exhibits an elevation of a circular moulding mitered into a horizontal moulding. The shape and plan of the moulding is shown at B. It is evident that by producing the line AD to intersect the center line

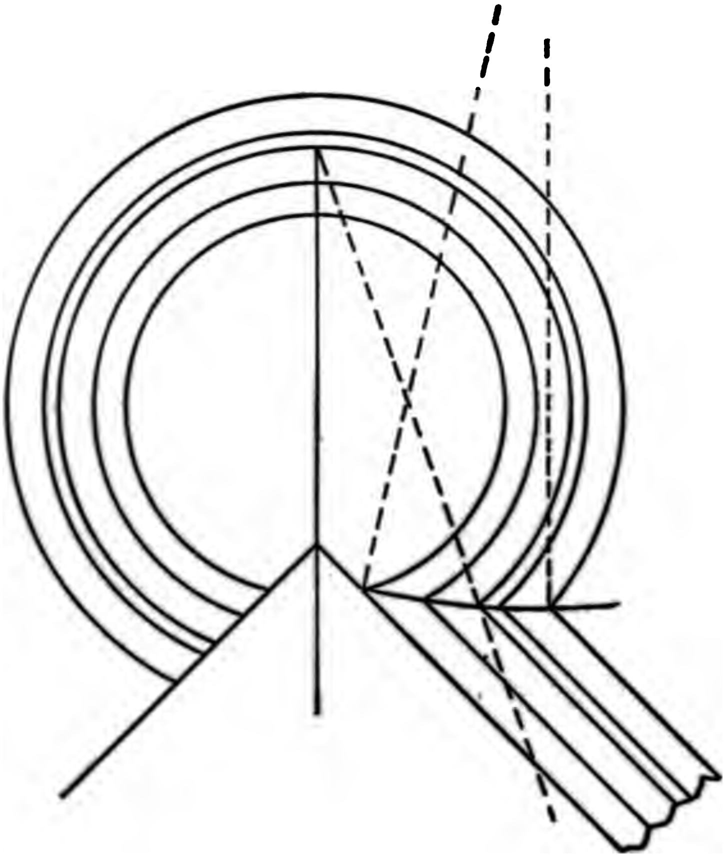


FIG. 196

of the arc at C, the central point will be obtained, from which the circular piece required for the moulding may be described. EA and FD give the radius for the curves of both edges when the stuff is in position, as shown in the elevation.

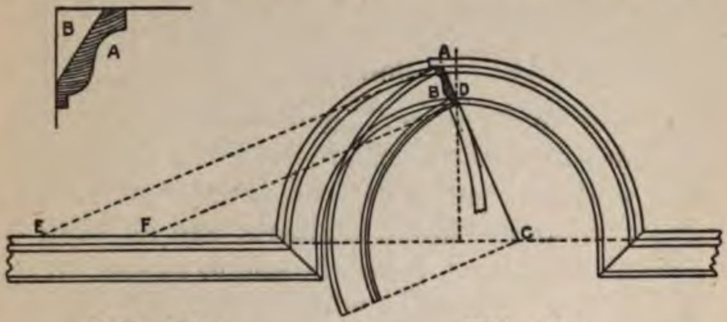


FIG. 197 FIG. 198

Fig. 199 shows the application of the same rules to a **circular elevation of a different form standing over a straight plan.** The back lines of

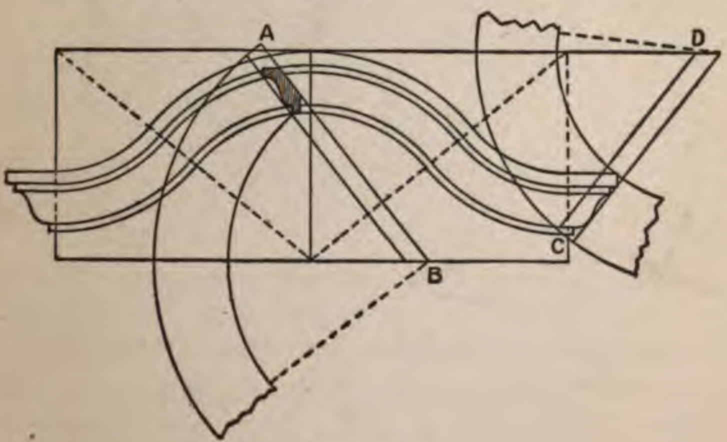


FIG. 199

the moulding are produced until they bisect a horizontal line drawn through the center, from which the circular cornice was struck, as shown by the lines AB and CD.

## Joinery.

The term "joinery," applied in a general sense, includes all the finishings to the carcass of a building, whether they be external or internal, such as doors, windows, stairs, skylights, and all kinds of panelling,—in fact, it may be said to include everything that is planed and wrought up to a nice smooth and often ornamental face, and framed

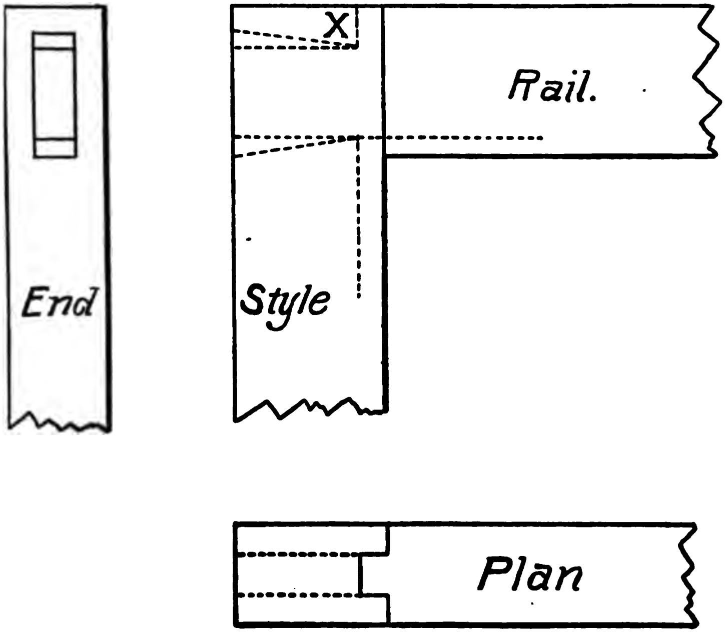


FIG. 200

together in such workmanlike and precise manner that it is difficult to discern the joints unless helped by the different grain and color of the stuff, as the wood is called.

It is intended to devote most of this chapter to a description of the various joints, mouldings, and terms which are used in this particular branch of building; but the principal and most common joints, etc., will be pointed out to the student when they are met in the different kinds of joiner's work.

**Framed Joints.**—The mortise and tenon is the chief and most common of all the joints used in joinery framing. All rails of doors, for instance, are tenoned through the styles and wedged up tight, as Fig. 200, the tenon usually being one-third of the thickness, and with a haunch left on as at X, to fill up the panel groove on the styles and strengthen the joint. This is the origin of the term haunched tenon, a sketch of which, as it is

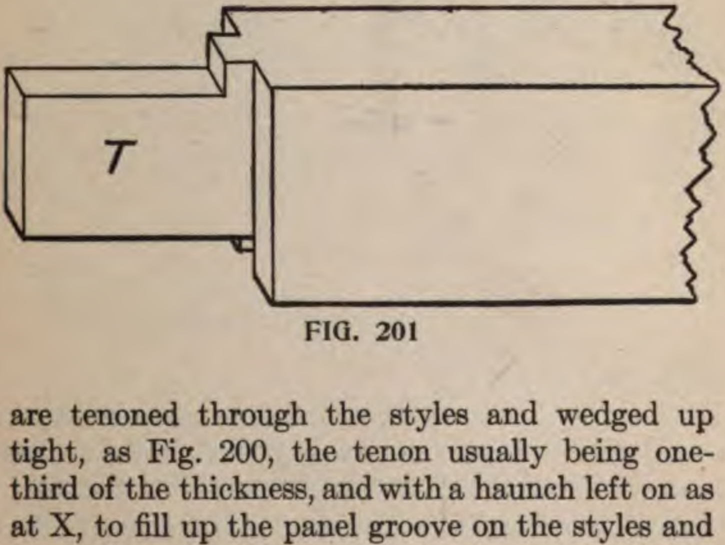


FIG. 201

on the rail before being wedged up into the styles (as shown in Fig. 200), is given in Fig. 201.

On wide rails, such as lock or middle or bottom rails, this tenon is in two parts in its depth, as in Fig. 202; and where the doors are more than two inches thick, or where the provision has to be made for a mortise lock, which, when let into the center of the style, at lock rail height, completely cuts away a central single tenon, the tenons are double in thickness, and called double tenons, as Fig. 203.

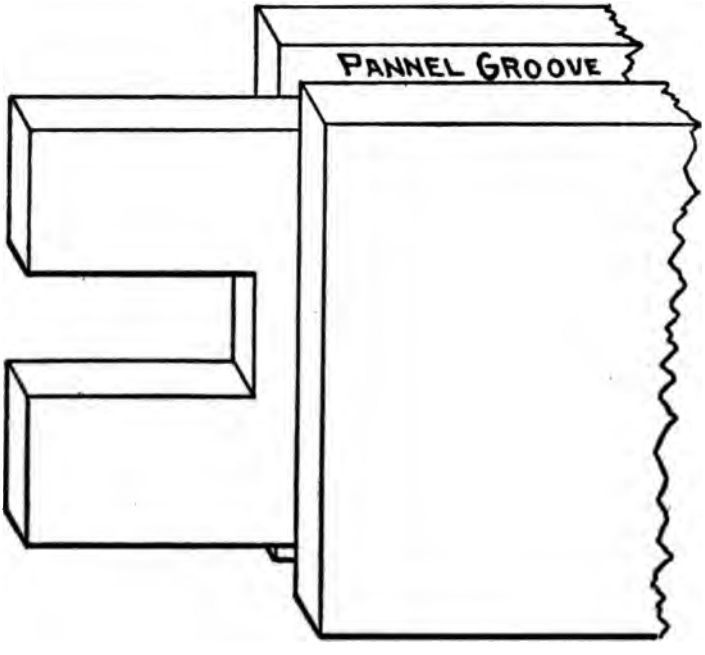


FIG. 202

A **bare-faced tenon** is a tenon with only one shoulder, S, used chiefly in framed ledges and braced doors, where the rails are not so thick as the styles by the thickness of the boarding nailed on the rails between the styles. Fig. 204 illustrates a bare-faced tenon, one view being given of each side.

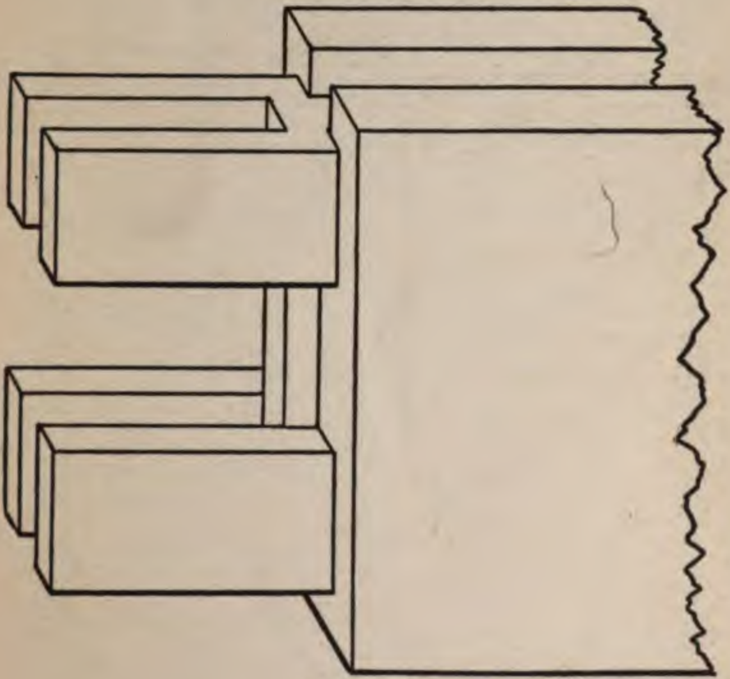


FIG. 203

A **housed tenon** is one let into a mortise with the section of the stuff let into the mortise to the depth of half an inch, as Fig. 205.

**Angle joints.**—Tongued angles are used for internal angles of skirtings, grounds, casings, etc., as Fig. 206.

**Mitered angles** are made by simply cutting half a right angle alternately off the two pieces, to be joined by nails at an external angle, as Fig. 207.

**Mitered and tongued angles**, a combination of the last two, are as Fig. 208, and are only used in best work, at the external angles of dadoes, pilasters, etc.

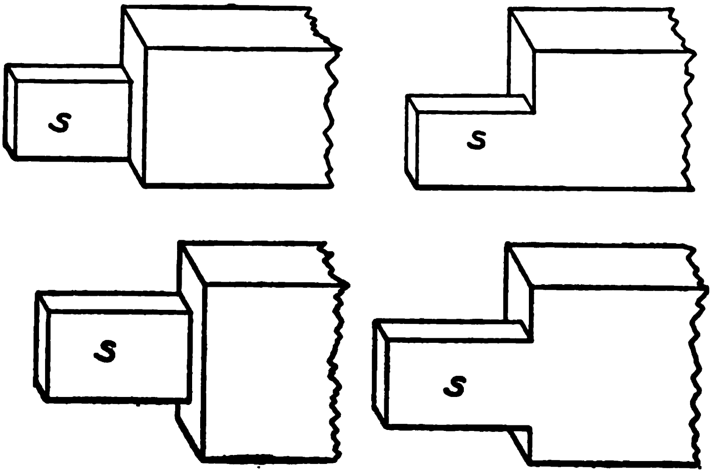


FIG. 204

**Beaded and tongued angles**, illustrated by Fig. 209, are angles or joints of an ornamental as well as necessary character.

**Return-beaded angles** are suitable for all external miters where wear and tear would soon fetch the arrises off in soft woods. Fig. 210 shows one on wood framing, casings, etc., and Fig. 211 one as fixed to angles to plastering on wood, brick or stone walls, to which they are fixed by plugs, as will be explained hereafter, this being called a staff bead.

Where the two pieces of framing to be joined are of different widths or thicknesses the "mitered angle" is made as Fig. 212. Another form of very good construction, is as Fig. 213.

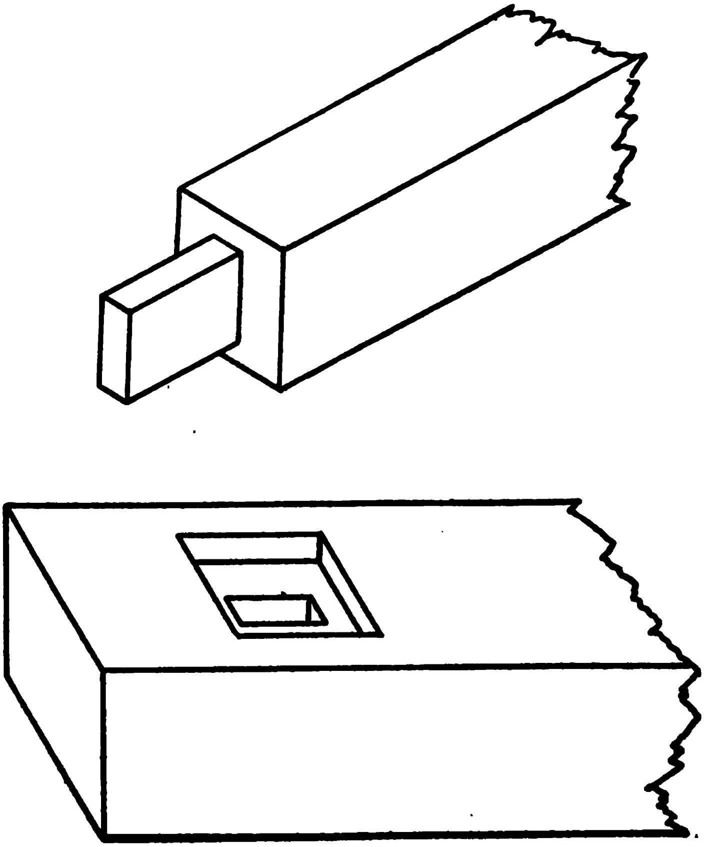


FIG. 205

**Keyed mitered joints** are not often used; but it is as well that the carpenter should know what they are. Fig. 214 is a view of the angle of one, XX being hardwood-slips let into the miters.

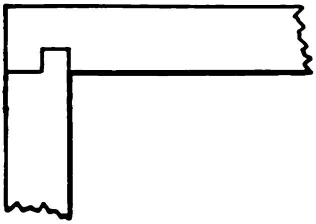


FIG. 206

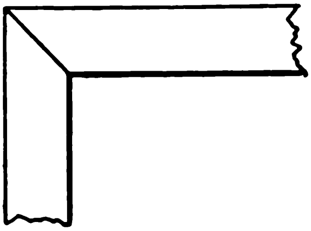


FIG. 207

Housed joints are as Fig. 215, by which the whole thickness of the cross-framing is let into the other about half an inch.

Glued and blocked joints are really butt or

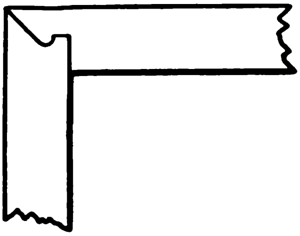


FIG. 208

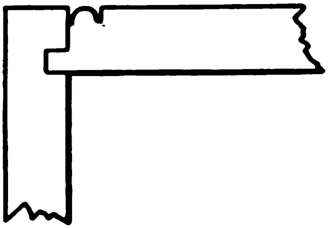


FIG. 209

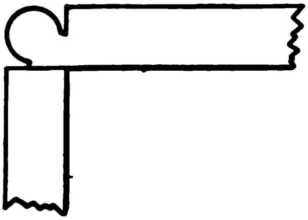


FIG. 210

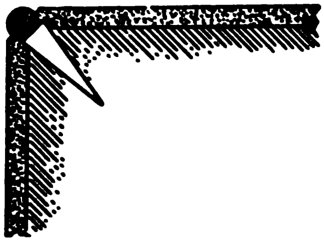


FIG. 211

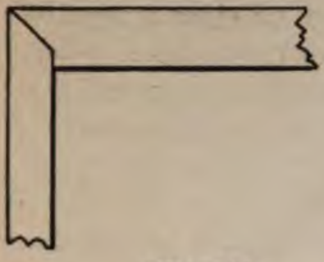


FIG. 212

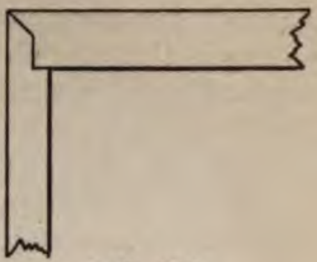


FIG. 213

lapped joints secured by blocks glued to each piece of wood in the internal angle (Fig. 216).

**Dovetails.**—To make a good dovetail joint requires considerable skill and care on the part of the

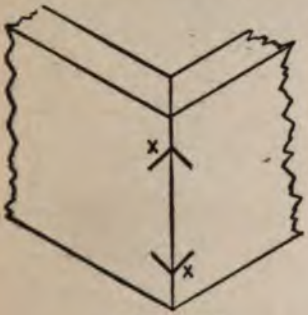


FIG. 214

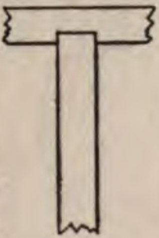


FIG. 215

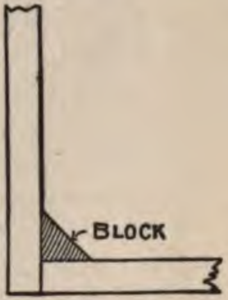


FIG. 216

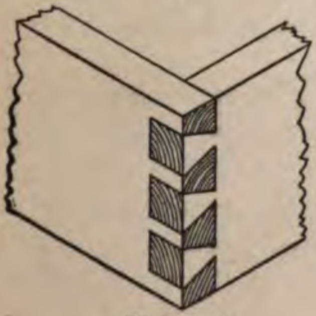


FIG. 217

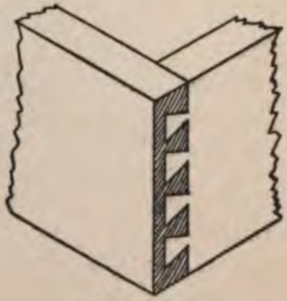


FIG. 218

operator; but when completed, no other system of joining boards at right angles proves so satisfactory. There are three kinds: the common, as Fig. 217; the lap, as Fig. 218; and the secret or mitered, the most troublesome of the three, as Fig. 219. It will be seen that they consist of wedge-shaped alternate cuttings out of each piece, the projections of the one fitting the holes on the other.

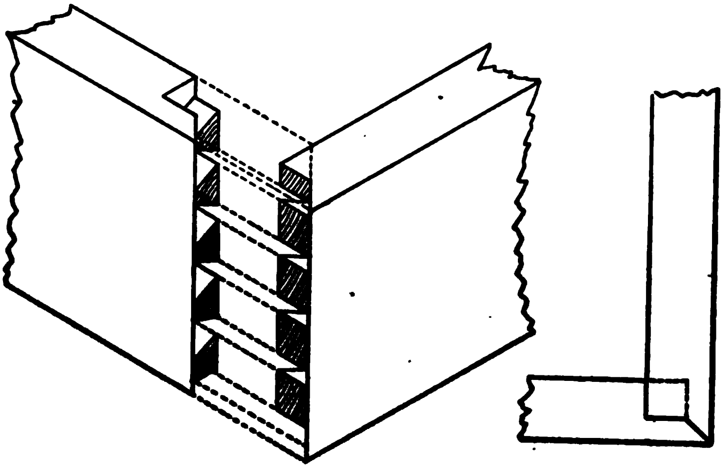


FIG. 219

**Cross-tonguing** is the method of joining two or more boards longitudinally, a loose tongue being glued and let into a groove on each board, as Fig. 220. This loose tongue is sometimes called a slip feather, and is made of wood across the grain. Long tongues have the grain of the wood in the direction of their length.

**Clamping** is the method by which the ends of several boards are fastened together, as shown on the left hand of Fig. 221, while the right hand side of the same figure illustrates miter-clamping, by which the cross-grain end of the ordinary clamping is obscured.

**Keying** (Fig. 222) is a means of securing several boards together by a flush key, let in at the back in lieu of a projecting ledge, where the latter would be inconvenient on account of a level face being required on each side. This is often used for wide door casings.

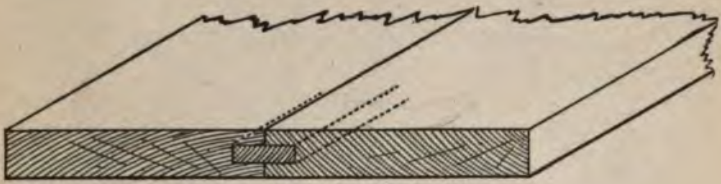


FIG. 220

Keyed joints are also used to connect circular with straight or two pieces of circular wood, such as door frames, etc. A shallow mortise is cut out

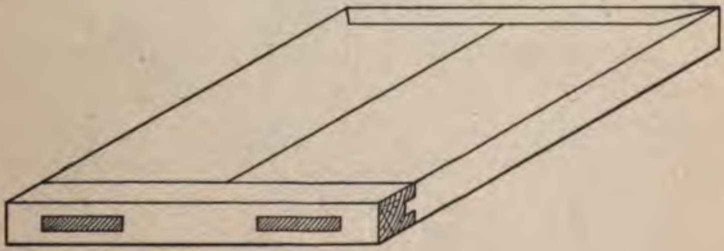


FIG. 221

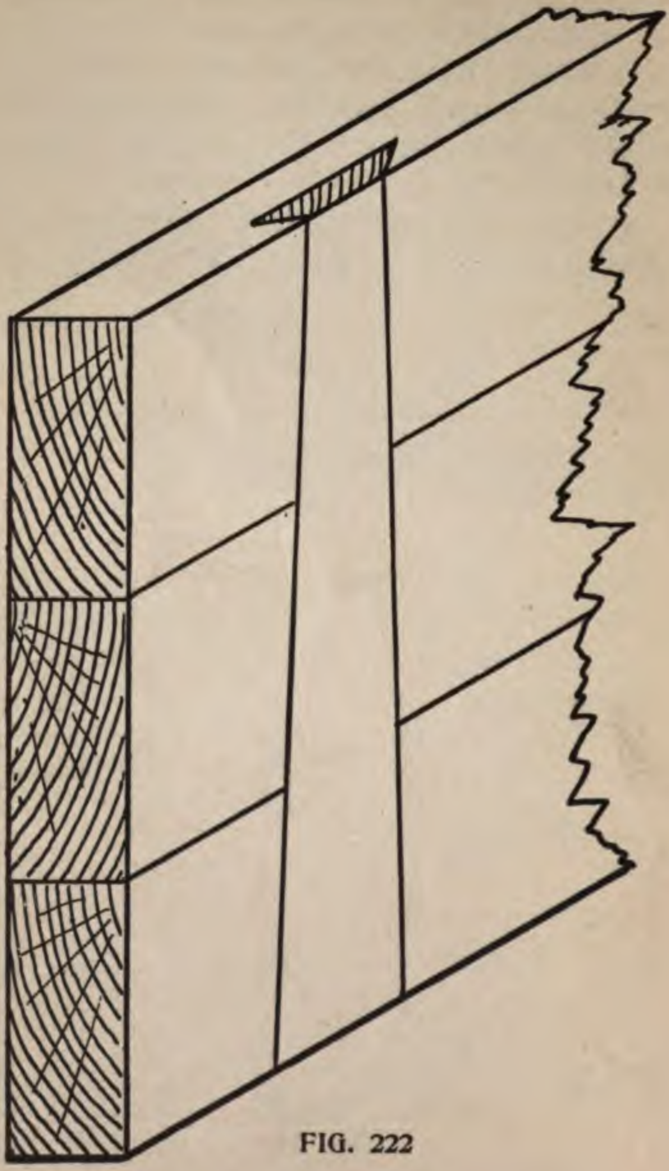


FIG. 222

of each part, and a hardwood key, (in the form of the letter I) connects the two together.

**Scribing** is the cutting, out of the face of one moulding, a hole of the contour of another to form a joint. It is chiefly used in joints of sashbars, internal angles of moulded skirtings, etc., and

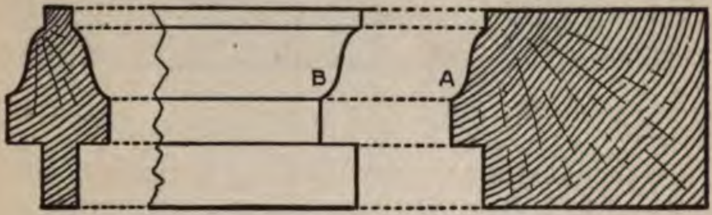


FIG. 223

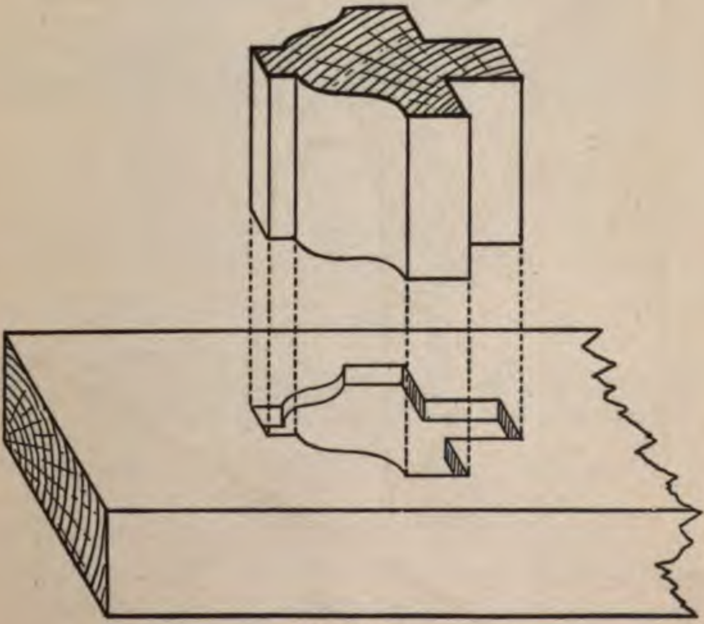


FIG. 224

really is a moulded mortise cut into another moulding to receive a moulded tenon of the same section as the mortise, but in a converse form. For instance, in Fig. 223, it will be noticed that on A a moulded mortise or notching is cut out, with the ovolo hollow, as it were; and on B, which we will call the tenon, the cutting has the ovolo convex or projecting to fit and fill up the hollow on A.

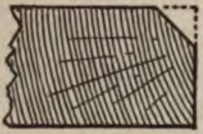


FIG. 225

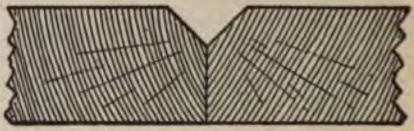


FIG. 226

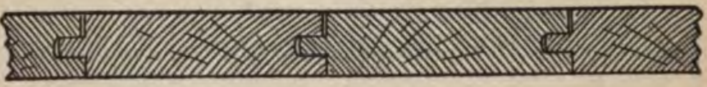


FIG. 227

A scribed housing is a housing made to the contour of the moulding it is going to receive (Fig. 224).

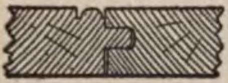


FIG. 228

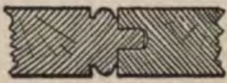


FIG. 229

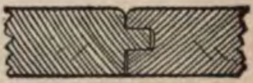


FIG. 230

**Chamfering** is the taking off of the arris or sharp edge of an angle, as Fig. 225, the angular groove formed by the meeting of two chamfered angles (Fig. 226) being called a V-joint.

**Match Boarding.**—This is an arrangement of boards matched and put together with grooved and tongued joints, and their edges "shot" or planed truly, so that a fine joint can be made. Match boarding, otherwise called cleating, is of several kinds, the chief of which are:

Plain matched boards (Fig. 227).
Beaded-one-side match boarding (Fig. 228).
Beaded-both-sides match boarding (Fig. 229).
V-jointed match boarding (Fig. 230).

# Part IV

JOINTS, STRAPS AND OTHER FASTENINGS. Lengthening ties — Scarfing — Simple method of scarfing — Building beams — When one piece is perpendicular to another — When the pieces to be joined are not at right angles to one another — Resistance at the joint — Effect of shrinkage and expansion — Maxims to follow

The joints in the framing of timber having to resist the strains to which the pieces are exposed, should be formed in such a manner that the bearing parts may have the greatest possible amount of effective surface. For should that part of the joint which receives the strain be narrow and thin, it will either indent itself into the pieces to which it is joined or become crippled by the strain; producing in either case a change in the form of the framing.

The effect of the shrinkage and expansion of timber should also be considered in the construction of joints. On account of the shrinkage of timber, dovetail joints should seldom be used in carpentry, as the smallest degree of shrinking allows the joint to draw out of its place; they can only be used with success when the shrinkages of the parts counteract each other; a case which seldom happens in carpentry, though very common in joinery and cabinet-making.

Joints should also be formed so that the contraction or expansion may not have a tendency to split any part of the framing. The force of contraction or expansion is capable of producing astonishing effects where the pieces are confined, which may sometimes be observed where framing has been wedged too tightly together in improper directions. The powerful effect of expanding timber is well know to quarrymen, as they sometimes use its force to break up large stones.

In forming joints the object to be attained should always be kept in view, as that which is excellent for one purpose may be the worst possible for another. With this consideration the subject will be treated under separate headings as follows:

**Lengthening Ties.**—The simplest and perhaps the best method of lengthening a beam is to abut the ends together, and place a piece on each side; these, when firmly bolted together, form a strong and simple connection. Such a method of lengthening a tie is shown by Fig. 231, and is what ship-carpenters call fishing a beam. It is obvious, however, that the strength in this case depends on the bolts, and the lateral adhesion and friction produced by screwing the parts tightly together.

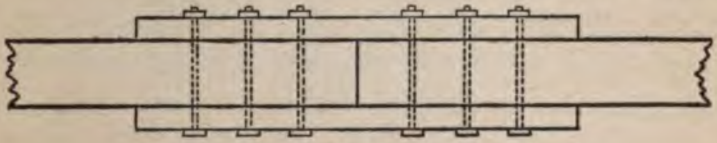


FIG. 231

The dependence on the bolts may be lessened by indenting the parts together, as shown by the upper side of Fig. 232; or by putting keys in the joint, as shown by the lower side of the same figure; but the strength of the beam will be decreased in proportion to the depth of the indents.

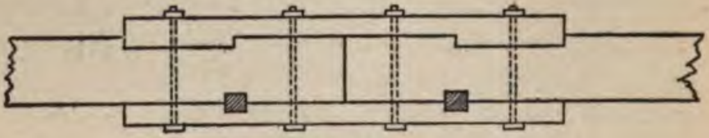


FIG. 232

The only reasons for not depending wholly on bolts are, that should the parts shrink ever so little, the bolts lose a great part of their effect; and the smallness of the bolts renders them liable to press into the timber, and thus to suffer the joint to yield.

The most usual method of joining beams is that called **scarfing,** where the two pieces are joined so as to preserve the same breadth and depth throughout; and wherever neatness is preferable to strength, this method should be adopted.

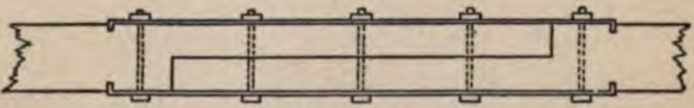


FIG. 233

Fig. 233 is the most **simple method of scrafing;** it depends wholly on the bolts, and in this and like cases it is best to put a continued plate of iron on each side to receive the heads of the bolts. The ends of the plates may be bent and let into the beams.

Fig. 234 is another very common method, but not so good a combination, as the bolts do not press the surfaces in a perpendicular direction; and an oblique pressure, such as would be likely to take place in this example must have some tendency to separate the joint, and it has no advantage in other respects.

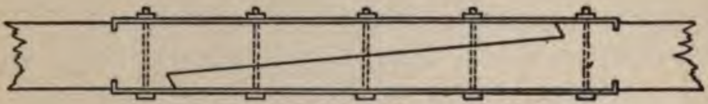


FIG. 234

Fig. 235 is a joint where bolts would not be absolutely necessary, but it is clear that the strength would not be quite so great as half that of an entire piece; the key, or double wedge in the center of the joint, should only be driven so as to bring the parts to their proper bearing, as it would be better to omit it altogether than to drive it so as to produce any considerable strain on the joint. It is not necessary that there should be a key, except when bolts are to be added, and then it is desirable to bring the joints to a bearing before the bolts are put in. The addition of bolts and straps, however, makes this an excellent scarf.

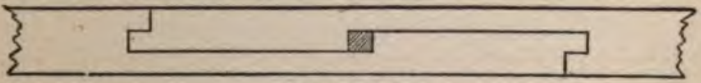


FIG. 235

The following are some maxims that will be sufficiently accurate for practical purposes:

In oak, ash, or elm, the whole length of the scarf should be six times the depth or thickness of the beam, when there are no bolts.

In fir the whole length of the scarf should be about twelve times the thickness of the beam, when there are no bolts.

In oak, ash, or elm, the whole length of a scarf depending on bolts only, should be about three times the breadth of the beam; and for fir beams it should be six times the breadth.

When both bolts and indents are combined, the whole length of the scarf for oak and hard wood may be twice the depth; and for fir or soft woods, four times the depth.

**Building Beams.**—If two plain pieces of timber were laid upon one another, and supported at the ends, the pressure of a weight applied in the middle would cause them to bend, and the surfaces in contact would slide against one another, the upper piece sliding towards each end upon the lower one. This sliding is effectually prevented by indenting the surfaces, as shown in Fig. 236, when the pieces are bolted together; but if the same indents be

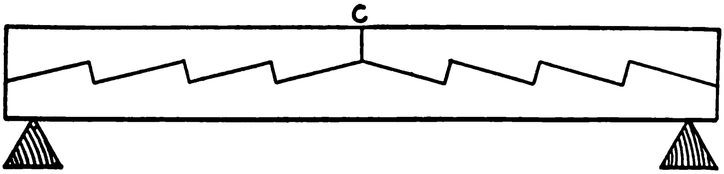


FIG. 236

reversed, as in Fig. 237, they produce scarcely any effect, and nearly the whole strain is upon the bolts.

Wherever the principal strain on the beam may happen to be, to that point, as at C, Fig. 236, the indents should direct their square abutments; that is, toward the straining force. When the beam is uniformly loaded, the greatest strain is at the middle.

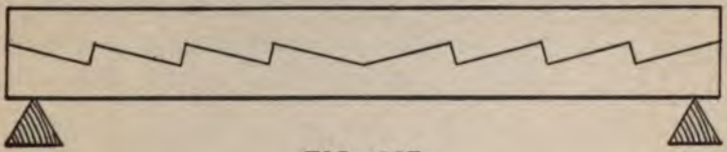


FIG. 237

In drawings we frequently see all the indents put the same way, and sometimes as in Fig. 237, otherwise the preceding remarks would have appeared to have been unnecessary.

We will now proceed to describe some of the joints of most common occurrence, and endeavor to point out improvements that might be made in some of them.

**When one piece is perpendicular to another,** as, for example, a post upon a sill, the usual, as well as the most easy method, is to make the joint square, with a stub or short tenon of about one-fourth of the thickness of the framing, to retain it in its place.

But if the joint be not very accurately cut, the whole load will bear upon the projecting parts; consequently, the center of pressure will seldom coincide with the axis of the post, and its power of resistance will be much lessened.

If, instead of cutting the joint square, it were cut to form an angle, as shown by Fig. 238, then a very little care in cutting the joint would make the center of pressure coincide with the axis.

**When the pieces to be joined are not at right angles to one another,** the joints may be similar to those used for the principal rafter of a roof.

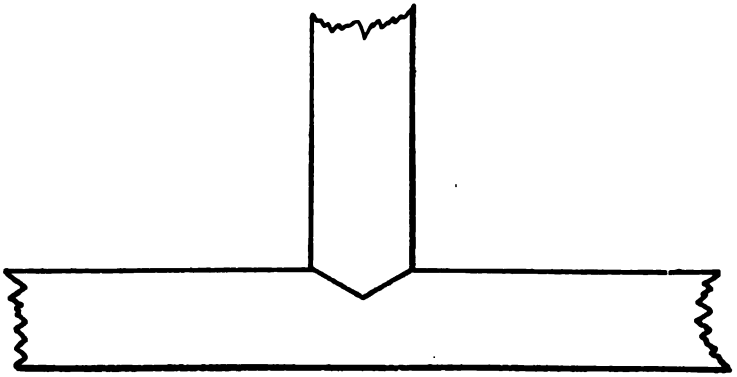


FIG. 238

**It is necessary to state that the direction of the strains, as well as their magnitude, remains sensibly the same, whatever may be the form of the abutting joints, except so far as the form of the joint alters the points of bearing; which may in some cases cause the pressure to act with a leverage nearly equal to half the depth of the beam. The strength of the joint itself depends upon its form, as it may be so made that there will be a**

tendency to slide, which it would be well to avoid, without having recourse to straps.

The **resistance at the joint** is always most effectual when the abutment is perpendicular to the strain, but where the angle formed by the inner sides of the pieces is very acute, this kind of abutment cannot be obtained, at least not without wounding the tie too much.

# Part V

STAIR BUILDING. To cut a pitch-board — Manner of applying the board — Section of stairs in position — Putting risers and treads together — Housed or closed string — Manner of finishing wall string — Sectional elevation through the steps — Cut or open string at the foot of the stairs — Square of the newel

In laying out stairs, it is first necesary to determine the height from the top of the floor which the stairs start from, to the floor which they are to land; also the run or distance of their horizontal stretch. This is found by dividing the height into the number of risers desired in the stairway. This usually results in fractions of an inch to each rise and complicates the work. However, the fractions may be avoided by the use of the story pole by spacing it off with a pair of compasses into the number of risers desired in the stairs. This being done the rest is comparatively easy because the run or horizontal stretch is not usually limited as to exact space as in the case of the rise of the stairs, and as there is always one less tread than there are risers its length is determined by the width given the treads. Thus if there are 14 risers in the stairs there would be 13 treads. If the treads be 9 inches wide the run would be 9 times 13 or 117 inches, which is 9 feet and 9 inches as shown in Fig. 239. From this it will be seen

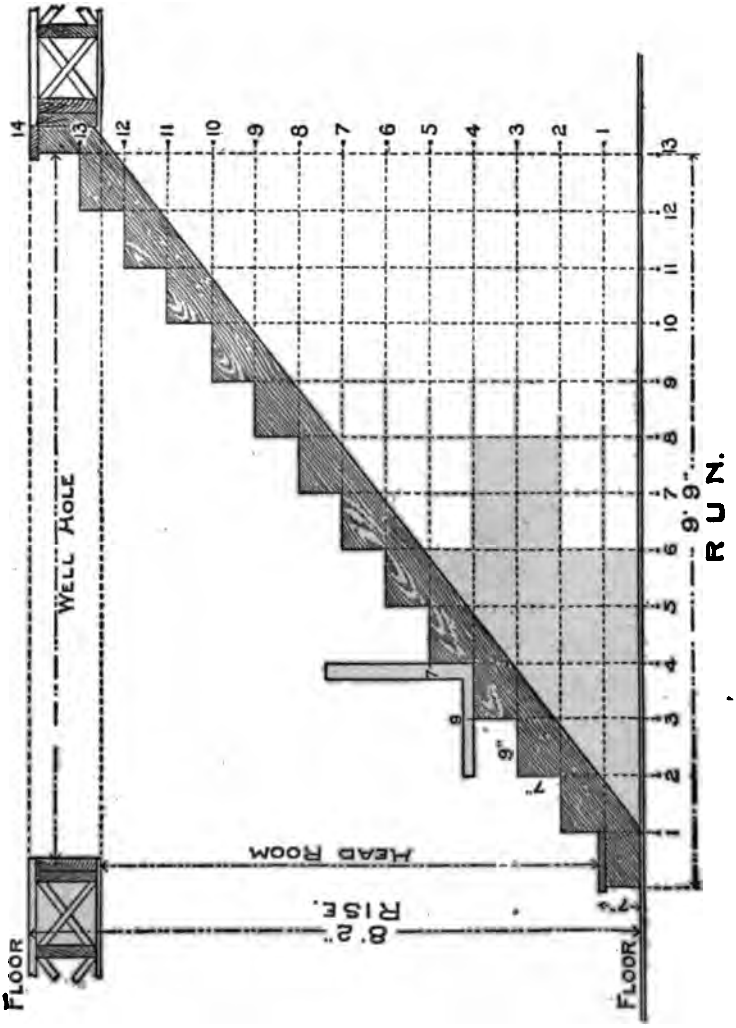


FIG. 239

that the run and rise of the individual step is taken on the steel square as shown in the illustration and determines the shape of the pitchboard. The way to make a pitch-board is by the use of the steel square, which, of course, every carpenter in this country is supposed to possess. Fig. 240 shows a part of the stair string with the square laid on, showing its application in cutting out a pitch-board. As the square is placed it shows 10 inches for the tread and seven inches for the rise.

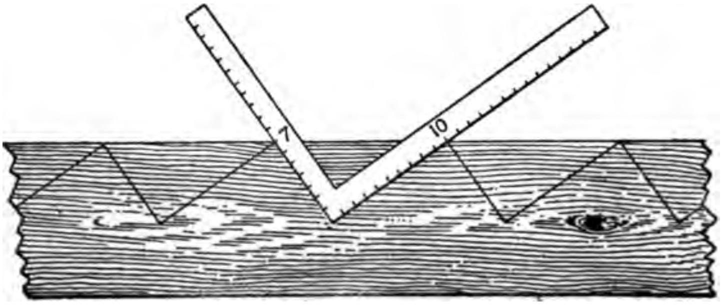


FIG. 240

**To cut a pitch-board,** after the tread and rise have been determined, proceed as follows: Take a piece of thin clear stuff, and lay the square on the face edge, as shown in the figure, and mark out the pitch-board with a sharp knife; then cut out with a fine saw and dress to knife marks, nail a piece on the largest edge of the pitch-board for a fence, and it is ready for use.

Fig. 241 shows the manner of applying the board. R, R, R, R is the string, and the line A shows the jointed or straight edge of the string.

The pitch-board, p, is shown in position, the line 8⅓ represents the step or tread, and the line 7¾ shows the line of the riser. These two lines are of course at right angles. This string shows five complete cuts for treads, and six complete cuts for risers. The bottom of the string at W is cut off at the line of the floor on which it is supposed to rest. The line C is the line of the first riser. This riser is narrower than any of the other risers, because the thickness of the first tread is always taken off it; thus, if the tread is 1½ inches thick, the riser in this case would only require to be 6¼ inches wide, as 6¼ and 1½ inches together make 7¾ inches. Another thing to be considered is the string, which must be cut so that the line at W will be only 6¼ inches from the line at 8⅓, and it must be parallel with it. The first riser and tread having been satisfactorily dealt with, the rest may be easily marked off by sliding the pitch-board along the line A until the line 8⅓ on the pitch-board strikes the line 7¾ on the string, when another tread and another riser are marked off in the same manner.

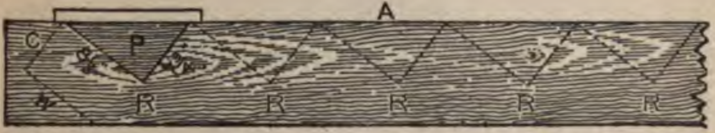


FIG. 241

Fig. 242 shows a portion of the stairs in position. S, S shows the strings, which in this case are cut square; that is, the part of the string to which the riser is joined is cut square across, and the "butt" or end wood of the riser is seen. In this case, also, the end of the tread is cut square off and flush with the string and riser. Usually in a stair of this kind the ends of the treads are rounded off similar to the front of the tread, and the ends project over the strings the same distance that the front edge projects over the riser. If a moulding or cove is used under the nosing in front, it should be carried round on the string to the back edge of the tread, and cut off square. The riser is shown at r, and it will be noticed that it runs down behind the tread on the back edge, and is either nailed or screwed to the tread.

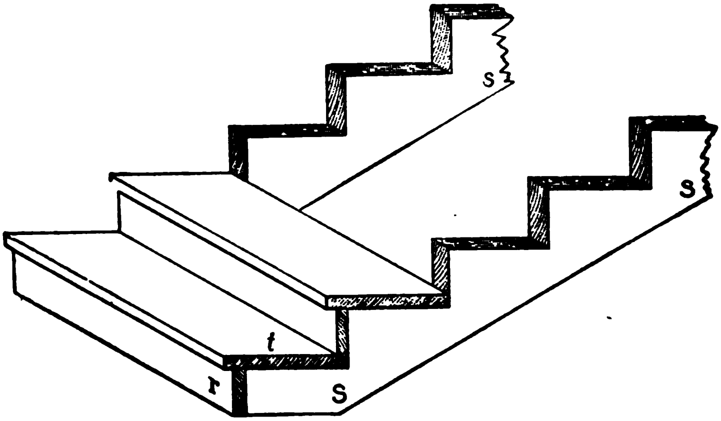


FIG. 242

Fig. 243 shows the customary way of putting risers and treads together. T, T shows the treads; R,R the risers; S,S the string; O,O the cove moulding under the nosing X,X. B,B shows the blocks that hold the tread and risers together. These blocks should be from four to six inches long, and made of dry wood. Their section may be from one to two inches square. On a tread three feet long, three of these blocks should be used at about equal distances apart, putting the two outside ones about six inches from the strings. They are glued in the angle. It will be noticed that the riser has a lip on the upper edge which enters into a groove in the tread. This lip is generally about $\frac{3}{8}$ inches long, and may be $\frac{3}{8}$ or $\frac{1}{2}$ an inch in thickness. Care must be taken in getting out the risers, that they

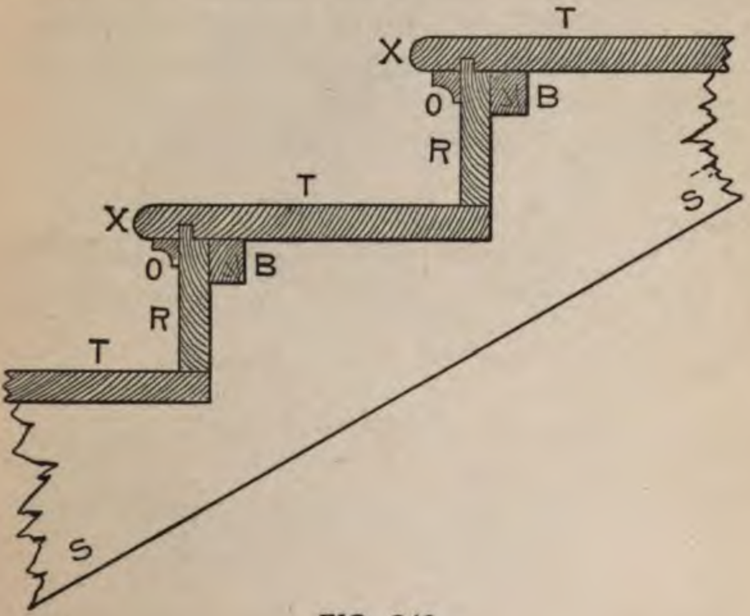


FIG. 243

are not made too narrow, as allowance must be made for the lip. If the riser is a little too wide, it will do no harm, as the overwidth may hang down below the tread; but it must be made the exact width where it rests on the string. The treads must be made the exact width required before they are grooved or the nosing worked on the outer edge. The lip or tongue on the riser should fit snug in the groove and bottom. By following these last instructions, and seeing that the blocks are well glued in, a good solid job will be the result.

Fig. 244 represents a **housed or closed string.** In this the risers and treads are let into the strings **from the back side. Gauge lightly a line from the**

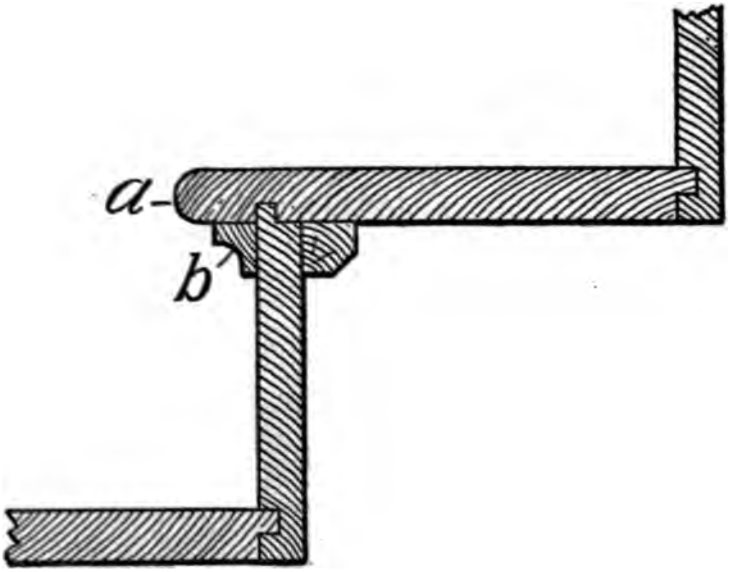


FIG. 244

upper edge of the string, the distance intended to stand above the treads as shown in the dotted line. On this line apply the pitch-board as explained on previous pages. In laying out housed strings it is as well to take the fence off the pitch-board, as it can be handled much better without it, as the long side will have to be kept close to the gauge line, to insure good work. The top lines for treads and the face lines for risers, are the lines that define the step, and cannot be changed; but the back line of the riser and the lower line of the tread should be made to run so that the housing or groove will be wider at the under side of the string than at the junction of the riser and tread at the nosing, where the grooves will be the same width as the riser and tread are in thickness separately. The nosing projects over the riser, as will be seen, and to mark this portion out it is usual to make a template or pattern for the purpose. Indeed it is best to make a template to lay out the whole housing of the tread, and in shape as the shaded part is shown in the illustration.

The reason the grooves are left wider at the back edge of tread is so that the wedge can be driven between the tread and the lower edge of the groove, to force the top side of the tread close to the upper edge of the groove, thus making a tight joint and insuring strength and rigidity to the whole structure. The risers are also wedged into place as will be shown later on. After the treads and risers are laid out on the string, a sharp pointed knife blade should be used to mark the lines for the face of the riser and top of tread, then a fine tenon saw should be used to saw down to the exact depth. This will not be difficult to perform when the hole forming the nosing recess has been bored to the proper depth. A gauge line should be made on the back edge of the string to indicate the depth of the housing. Care should be taken in removing the wood from the grooves that too much is not taken or the grooves made too deep. A gauge for trying the depth may be made out of a piece of hard wood, say about four inches long and three inches wide, by about one-half inch in thickness. Make a tenon on the center of one end, about three-quarters of an inch in width, and cut the shoulders back

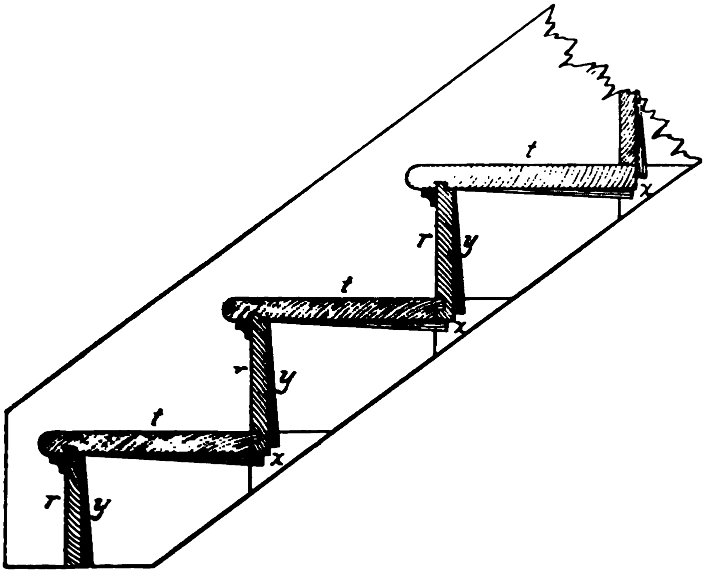


FIG. 245

sufficiently far enough to admit the tenon being long enough to touch the bottom of the groove or housing, when the shoulders rest on the face of the string.

In Fig. 245 we show a **sectional elevation through the steps.** The treads, t,t, and the risers, r,r, are shown in position. These are secured as will be seen by means of the wedges, x,x, and y,y, which are well covered with glue before they are inserted and driven home. Stairs made after this manner are strong and perfectly solid under foot.

Fig. 246 gives two views of a portion of a better class stair, a stair with cut and mitered string, or open string stair. In referring to the plan, WS shows the wall string; RS the rough string placed there to give the structure strength; and OS the outer or cut string. At a,a, the ends of the risers are shown, and it will be noticed that they are mitered against the vertical or riser line of the string, thus preventing the end wood of the riser from being seen. The other end of the riser is in the housing in the wall string. The outer end of the tread is also mitered at the nosing and a piece of stuff made or worked like the nosing is mitered against, or returned at the end of the tread. The end of this returned piece is again returned on itself back to the string, as shown in the upper portion of the cut, at n. The moulding, which is a five-eighths cove in this case, is also returned round the string and into itself.

The mortises shown at the black points, B,B,B, etc., are for the balusters. It is always the proper thing to saw the ends of the tread ready for the balusters before they are attached to the string, then when the time arrives to put up the rail, the back end of the mortise may be cut out, when the

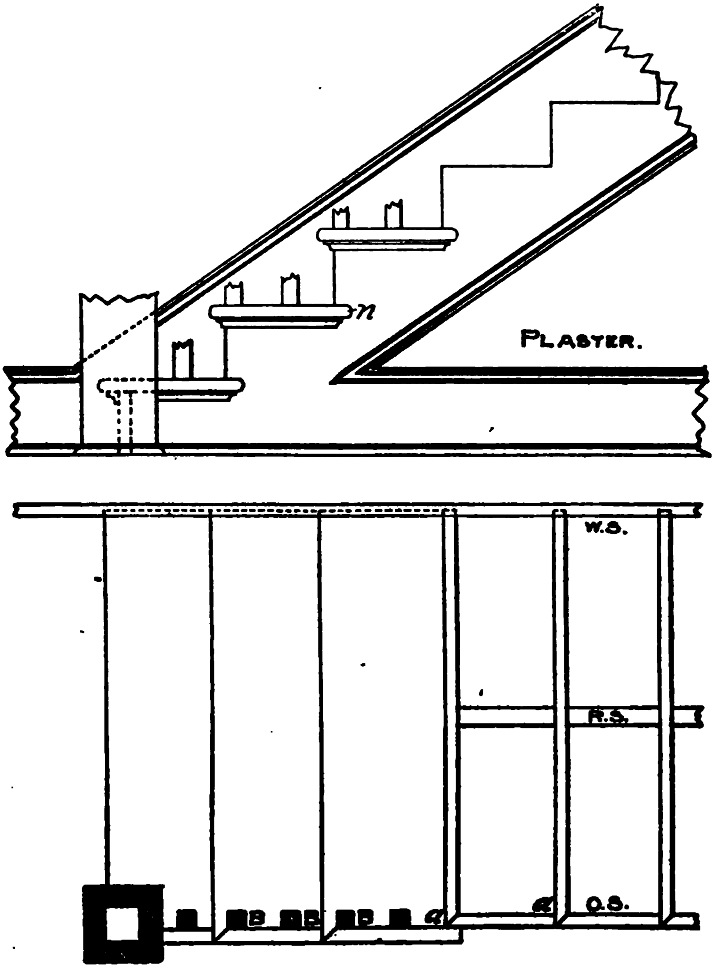


FIG. 246

tread will be ready to receive the baluster. The mortise is dovetailed, and, of course, the tenon in the baluster must be made to suit. The tread is finished on the bench, and the return nosing is fitted to it and tacked on so that it may be taken off to insert the balusters when the rail is being put into position.

Fig. 247 shows the manner in which the wall string is finished at the foot of the stairs. S shows

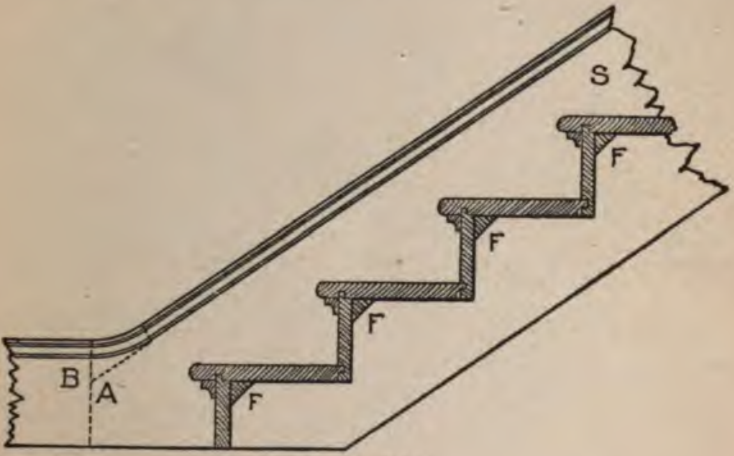


FIG. 247

the string with a moulding wrought on the upper edge. This moulding may be simple ogee, or may consist of a number of members, or may be only a bead, or the edge of the string may be left quite plain; this will be regulated in a great measure by the style of finish in the hall, or wherever the stairs are placed. B shows a portion of the baseboard, the top edge of which has the same finish as the top edge of the string. B and A together show the junction of the string and the base. The dotted line shows when a piece of stuff has been glued on to the string to make it wide enough at the junction to get the ease-off or curve. F,F show the blocks glued in the angle of the steps to make them firm and solid.

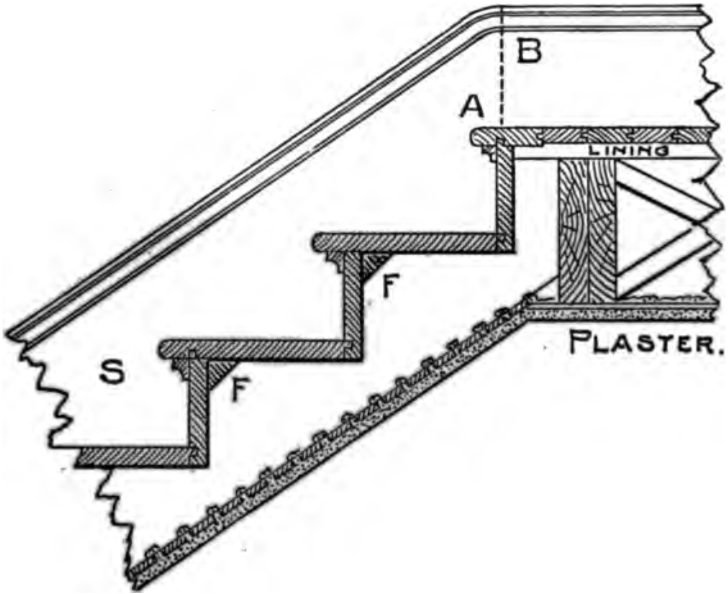


FIG. 248

Fig. 248 shows the manner in which the wall string S is finished at the top of the stairs. It will be noticed that the moulding is worked round the ease-off at A to suit the width of the base at B. The string is cut over the floor horizontally and vertically or plumb against the joists. The plaster line under the stairs and on the ceiling is also shown.

Fig. 249 shows the **cut or open string at the foot of the stairs,** and the manner of dealing with it at its juncture with the newel post K. The point of the string should be mortised into the newel two, three or four inches, as shown by the dotted lines, and the mortise made in the newel should be made near the center, so that the center of the baluster will be directly opposite the central line of the newel post. The proper way to manage this is to measure the central line of the baluster on the tread, and then make this line correspond with the central line of the newel post. By a careful attendance to this matter, much trouble will be avoided where the turned cap is used to receive the lower part of the rail. The lower riser, in a

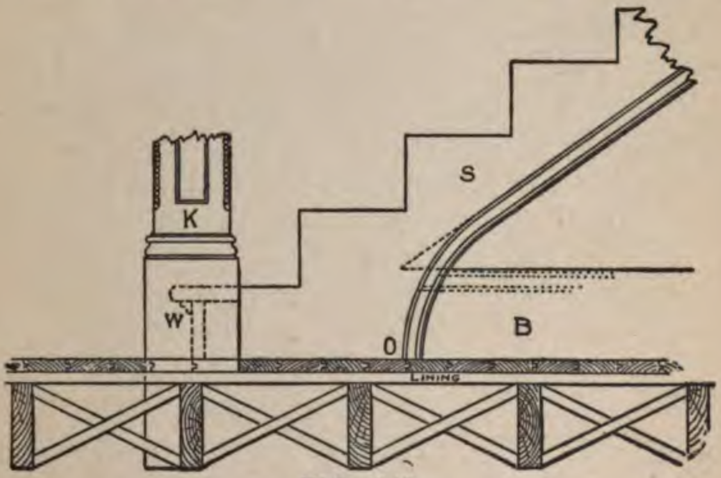


FIG. 249

stair of this kind, will be something shorter than the ones that follow it, as it must be cut between the newel and the wall string. A portion of the tread, as well as the riser, will also butt against the newel, as shown at W. If there is no spandril or wall under the open string it may run down to the floor, as shown at O. The piece O is glued on to the string, and the moulding is worked on the curve.

If there is a wall under the string S, then the base B, shown by the dotted lines, will finish against the string, and it should have a moulding stick on its upper edge the same as the one on the lower edge of the string, if any, and this moulding should miter into the one on the string. When there is a base, the piece O is dispensed with.

The square of the newel should run down by the side of the joist, as shown, and be firmly secured to it by iron knees or other suitable devices. If the joist run the other way, try and get the newel post against it, if possible, either by furring out the joist or cutting a portion off the thickness of the newel. The solidity of a stair, and the firmness of the rail, depend very much on the rigidity of the newel post.

# Part IV

## QUESTIONS AND ANSWERS.

### Safe Load for a Truss.

Question: Will you state the rule for getting the safe load to be carried by a truss? What the depth should be according to the length. I have a floor thirty feet wide and forty-two long and I want to put in a truss below. I want to truss up a ceiling thirty by forty-two feet, the one thirty feet to go through first and the forty-two to connect them ten feet from the end; and also the forty-two foot one. Now above these a hall which will be used for gatherings of all kinds. How deep will these trusses have to be to be safe? Steel beams will be safer than wood even though the latter be supported by truss rods with turn buckles, will they not? Would the thirty-foot truss have to be double? It would be safer, would it not? Please give me the formula for computing the strength of truss, how deep according to the length.

Answer: As we understand the question, he wishes to support a floor thirty by forty-two feet by means of trussed girders or steel beams, for if the room above is to be used as a dance hall, the trusses could not project above the floor. The information given is not sufficiently definite to enable one to say exactly what is required. In general we would say that the best way to support such a floor would be by means of girders extending across the building the narrow way, three girders

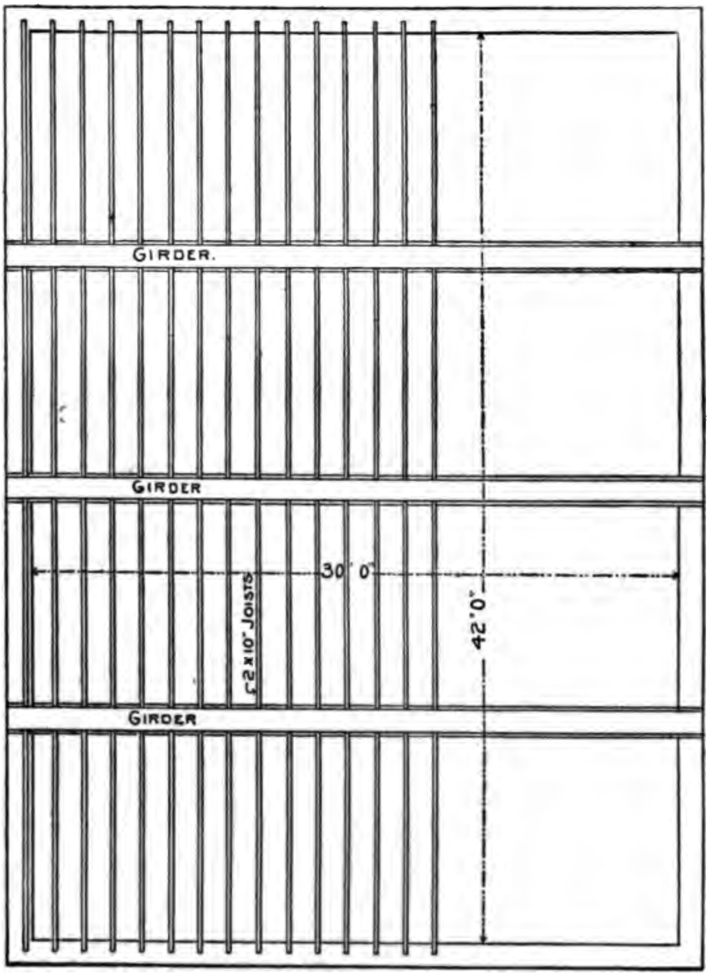


FIG. I. PLAN OF HALL FLOOR
SHOWING ARRANGEMENT OF JOISTS AND GIRDER.

being used in the length of the building, so that they would be about ten and one-half feet on centers. These girders would support two by ten-inch joists placed parallel with the sides. Each girder would be required to support a floor area 10½ times 30 feet, which equals 315 square feet. If the floor has a plastered ceiling below, and double flooring, the dead weight, including that of the girder, will be about twenty-five pounds per square foot. For a dancing floor the live load should be taken at 100 pounds per square foot at least, which would make a total of 125 pounds per square foot. As each girder supports 315 square feet of floor, it must be capable of supporting 125 times 315, which equals 39,375 pounds.

To support this load with a thirty-foot span will require a twenty-inch, sixty-five pound steel beam, or a trussed girder such as is shown in Fig. 2.

Owing to the fact that the strength of a truss depends as much upon the inclination and arrangement of the individual members as upon their size, it is impossible to give simple rules for figuring the strength of trusses.

For a trussed girder similar to that shown in Fig. 2 it may be said that the depth of the girder, measured from the top of the beam to the center of the rod or rods, should, for economy, be about one-tenth of the span, and if the depth is less than one-twelfth of the span, the rods will have to be excessively large. As a rule carpenters, in building trusses of this kind, generally make the beam large enough. but almost always use rods that are too light, and do not drop the rods sufficiently, so that the trusses sag greatly and often have to be reinforced.

When the struts are placed at the third points of the span, the strain in the rods may be very closely computed by the following rules:

When the depth H equals three inches plus one-tenth of the span, the tension in the rods is found by multiplying the load on the girder by one and sixteen hundredths, and when H equals three inches plus one-twelfth of the span the tension in the rods is found by multiplying the load on the girder by one and three-eighths. Knowing the tension in the rods, the necessary size of the rods or rod may be found from a table giving the strength of rods.

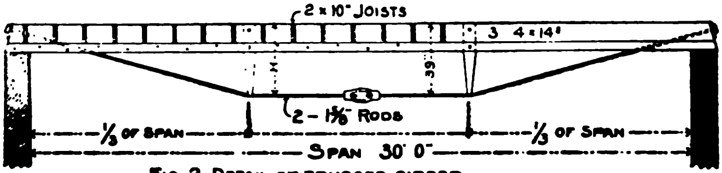


FIG. 2 DETAIL OF TRUSSED GIRDER.
DISTANCE CENTER TO CENTER OF GIRDERS, 10' 6"
SAFE LOAD FOR GIRDER, 40.000 LBS.

The depth of the girder shown in Fig. 2 is three inches plus one-tenth of the span (3 inches plus 3 feet equals 39 inches), consequently the tension in the rods will be 1.16 times the load, or 1.16 times 39,375, which equals 45,675 pounds. This strain will require two 1⅝-inch rods. If we reduce the depth, H, to 3 inches plus 1–12 of the span or 3 inches plus 2½ feet, which equals 33 inches, the tension in the rods would be 1⅜ times 39,375, which equals 54,140 pounds, which would require two 1¾-inch rods.

## Design of a Truss.

Question: I have to put up a building for a paper mill; the building is eighty-four feet wide and two hundred and forty feet long. The trusses will carry three-inch white pine plank, six-ply paper with tar gravel; an allowance is to be made for snow. There will also be a center load of fifteen thousand pounds which will come on these trusses. Please give a sketch of what you would recommend for the place, giving diameter of timbers and size of rods. Also give a rule for figuring this kind of truss, giving the height and angle of struts and the spacing and length of the same.

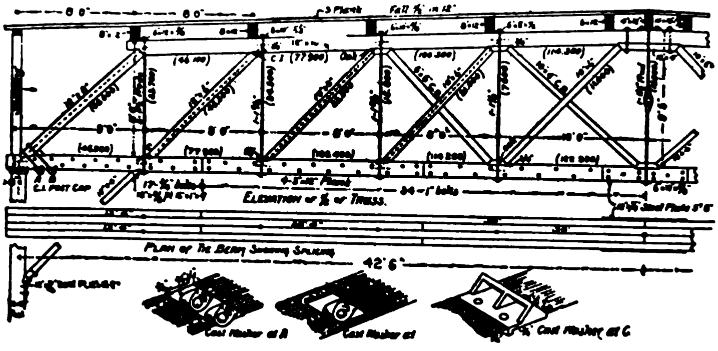
Answer: The accompanying illustration shows the proper design of a truss to meet the conditions stated by our correspondent. The stress in each member in pounds is given by the number in parenthesis.

These stresses are those that would be produced by the weight of the truss and roof, a snow load of 36 pounds per square foot, and a load of 15,000 pounds suspended from the center of the truss all applied at the same time. The weight of the truss purlins, planking and gravel roofing was estimated at 24 pounds per square foot.

An allowance for snow of 36 pounds per square foot may seem large, but in some portions of the North the snowfall is very heavy.

The stresses were computed by the graphic method, and would require too much space to explain in these pages.

In regard to the height of trusses of this kind, the height at the center measured between center lines of the chords should not be less than one-tenth of the span, and it is not economical to make the height greater than one-sixth of the span. In this case the height at the center is about one-ninth of the span. The braces should have an inclination of about 45 degrees, and where purlins are used the braces and purlins should be arranged so that the purlin will come over the top of the brace, or as near to it as practicable.



The purlins should be notched on to the truss one-half an inch, so as to hold the truss laterally, and the ends of the purlins should be tied together either by pieces of boards or iron straps.

In fitting the braces they should be located so that their center lines will intersect the center lines of the chords at the same point as the center line through the rods. This is shown in the engraving by dotted lines. For the braces in the center panels it was not practicable to do this, as it is desirable to bring the top of the brace near the six by ten purlin, so as to avoid a cross strain in the top chord.

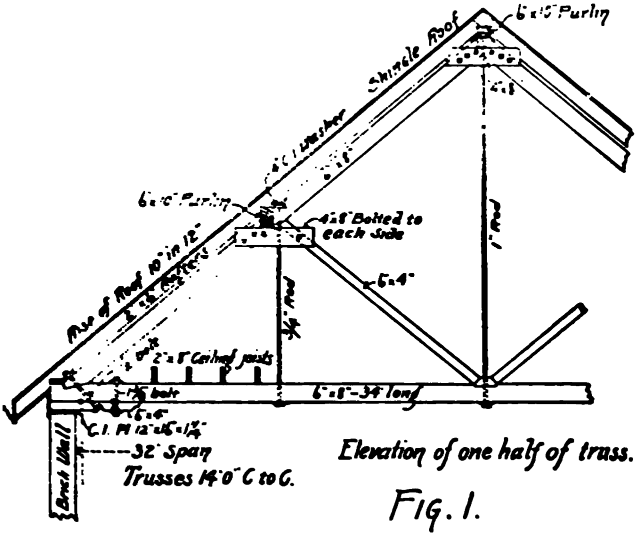
The braces marked CB (counter braces) are inserted to provide for any unequal loading of the truss, as might be caused by more snow on one side of the truss than on the other. Under a uniform load, there will be no stress whatever in these braces.

They should not be fitted in place until the truss is in position and had an opportunity to settle to its bearings.

The sizes given for the rods, are for plain rods, not upset. Upset rods are about as expensive for this class of work as plain rods, and upset rods require larger holes in the chords. The factor of safety in the rods under full load is about three and one-half. In the timber from four to eight. The method shown for building up the tie-beam seems to the writer the most economical and as satisfactory as any that can be employed. In this case four three-inch planks are used, lapping each other fifteen feet. Two planks have sufficient strength to carry the entire stress, and the stress must be transferred to the other two planks by the bolts. It will require the full number of bolts shown to transfer the stress. The end of the tie beam is shown projecting four inches outside the post. If the outside wall is frame, a panel can be placed over end of truss. All truss timber should be of Georgia pine.

### Size of Timbers in Truss Roof.

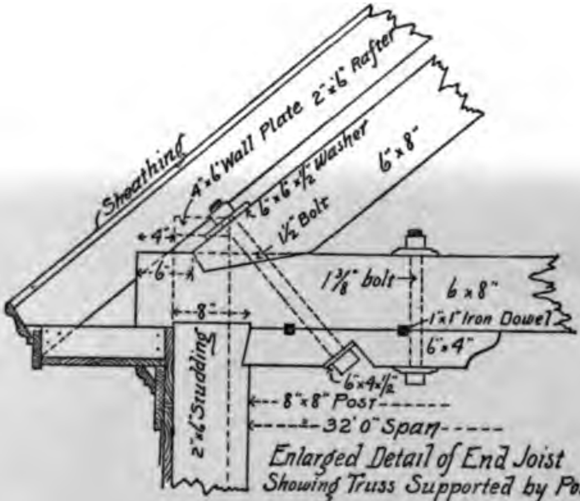
Question: Will you please tell me the proper size to have the timbers in a truss roof having a span of thirty-two feet, and what is the proper pitch to have the roof to look well and be substantial and self-supporting?



Elevation of one half of truss.

Fig. 1.

Answer: For either a slate or shingle roof, a pitch or rise of ten inches in twelve is both economical and pleasing in appearance. A steeper pitch is not objectionable except that it increases the length of rafters and consequently the cost. For the southern states, the dimensions given in Fig. 1 are about as small as should be used for trusses spaced fourteen feet on centers, and supporting a plastered ceiling. If there is no ceiling, and nothing to be supported but the roof, the truss rafters and tie beam may be made six by six, and the rods reduced to five-eighths and seven-eighths inches. The tie beam should be in one piece thirty-four feet long. Fig. 2 shows a detail for support on posts. If supported by a brick wall, the construction will be slightly modified as shown in Fig. 1. If the building is only one or two stories in height a twelve-inch wall will probably answer, but we recommend that it be reinforced under the trusses by a four by twenty-one-inch pilaster.



Enlarged Detail of End Joist Showing Truss Supported by Post.

FIG. 2.

### Hanging Sliding Parlor Doors.

Question: Please give the best method for hanging sliding parlor doors.

Answer: There are now many patented hangers on the market, each possessing more or less merit. Those with the steel track have largely superseded the wooden of a few years ago, and the hanging of same is an easy job to what it used to be. Full directions are furnished with each set and any of the leading kinds can be secured through the up-to-date hardware dealer. Any average workman should be able to put up the work. The main thing is to see that the partition rests on substantial bearings to prevent settlement, as this will necessarily throw the track out of level and affect the free working of the doors. Be sure to set the studding plumb and properly spaced for the pocket. Never set the studding flatwise with the door. Never allow a hot air pipe to run up

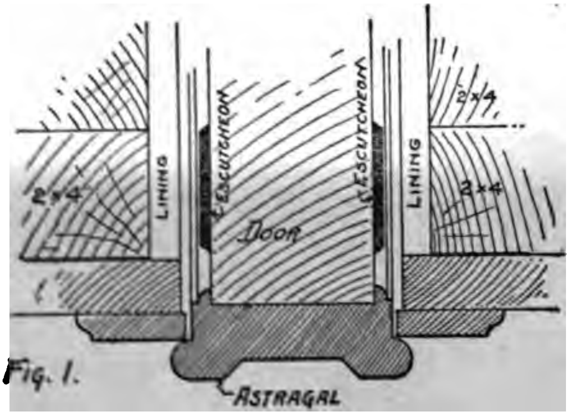


Fig. 1.

beside the sliding door, when it is possible to place it in some other partition. Always double the studding at the jambs and be sure to make proper calculations for the opening so that when the finished work is in place, the full face of the door will show when closed. Be sure to have the woodwork over the opening perfectly rigid. Two well seasoned joists spiked together and set up edgewise make a good truss, or lintel, and an excellent surface on which to secure the track. The short studs can rest on this lintel and can be retrussed by cutting in cross braces, or truss shaped braces can be put in above the hanger. In this, the workmen should take into consideration the load that is to be carried above and build accordingly. In good work, the pockets should be lined with tongue and grooved boards, which may be done with thin stuff, but whether this is done or not, be sure to have the pocket openings cut off at the back end so that there will be no connection with

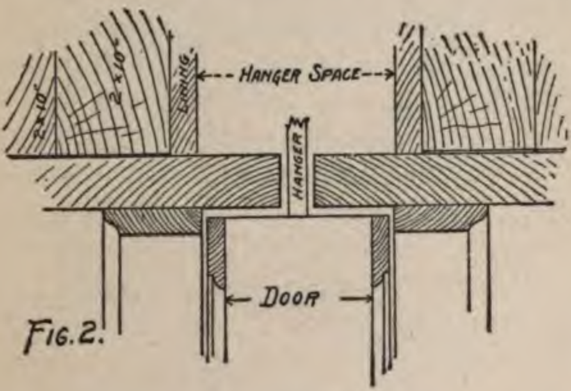


FIG. 2.

other openings in adjoining partitions and outer walls. This should be done for several reasons. First, to heat the house, because these openings will create a draft, then again if a fire gets started in a partition, these openings furnish an excellent draft to fan on the flames.

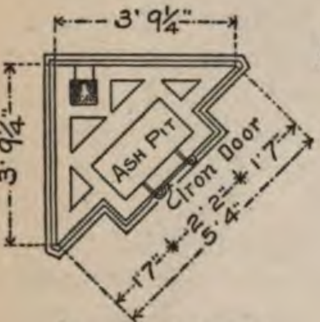
Another point we might call attention to and that is, the unsightly notching out of the stops to allow the raised escutcheon to pass into the pocket. This can be avoided by running a stop around both sides of the door and membering with the astragal as shown in Fig. 1. The stops on the jambs are set as shown. Thus, it will be seen that the escutcheon is cleared and that when the door is shoved back, the astragal will cover the pocket opening and to all appearance is simply a mould made fast to the jambs. The head jambs should be set to allow only for the free working of the hanger as shown in Fig. 2.

### Constructing a Fireplace.

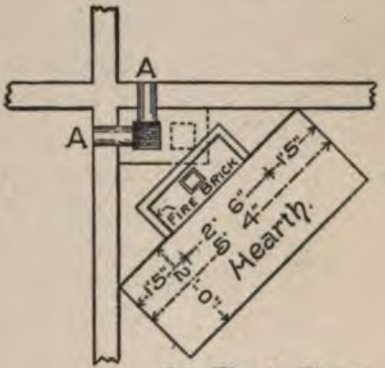
Question: Will you kindly illustrate how to construct a fire-place?

Answer: In the illustration herewith two flues are shown, one to extend to the basement floor, and is for use of stoves in adjoining rooms. While we have shown four openings to this flue there are not supposed to be more than two stoves in use at the same time, otherwise the draft is liable to be overtaxed, as the flues have designed calls for only one brick square opening, or from 64 to 70 inches, according to the size of the brick.

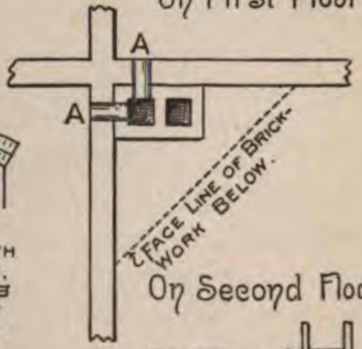
When thimbles are put in to make connection with adjoining rooms, the brick work should be corbled out to the full thickness of the wood partition, and a long thimble used to extend through the brick work, being careful not to let the thimble protrude



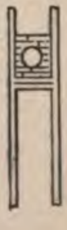
In Basement



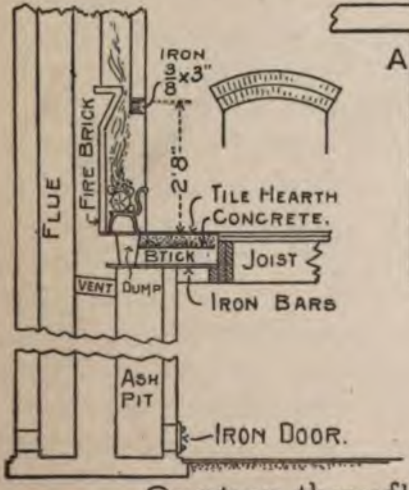
On First Floor



On Second Floor.



Bricking in of thimble at A.



Section through Fire Place.

nto the flue space. At sketch A another way of widening the brick work at the thimble is shown, which is simply to cut in a cross piece between the studding, and on this build the extra brick work with all joints well filled with mortar. In all cases the thimbles should be set at the time of building the chimney, being careful that all joints are well filled and tuck pointed on both sides, and in addition to this it would be well to plaster on the inside of the flue from bottom to top.

In the illustration we have shown an ash pit beneath the fire-place where the ashes may be dumped and taken out later. This pit should have a vent into the flue so that when the ash dump is opened a downward draft will be created which will prevent the ash dust from flying back into the room. For supporting the hearth we use iron bars made of ½ by 2 iron, and on this lay brick edgewise, leaving a space of three or four inches for concrete on which to lay the tile hearth. The fire-place should be lined with fire brick with the upper part of the brick slanted toward the front and carried up a few inches above the top of the opening, as shown in the cross section. The arch in front should be supported on a segment made of ⅜ by 3 inches wrought iron set back from the front so that it will not show. If a straight top opening is desired then use a 3-inch by-3 inch angle iron with the flange on the inside of the brick work.

The dotted lines show the position of the flue for the fire-place and will require the opening or throat to draw over to it, but it should start straight from the fire place and gradually draw over to its position as shown. The face of the brick work should carry up to the ceiling of the first story and this gives ample space to make the proper bend in the flue. The flues should be independent from other openings. Cast iron hoods with damper attachment are quite often used to form the top of open fire-places and are set in place at the time of building the chimney. The top should be capped with Portland cement or with a 3 or 4-inch flat stone with openings cut to fit the flue openings.

## How to Finish a Store Front.

Question: I would like to have you give illustrations and describe one or two ways of finishing off store fronts where rectangular cast iron columns are used. This refers especially to wood work in connection with same. I have never seen anything relating to the above subject.

Answer: Fifteen or twenty years ago it was quite the common way to use columns and cast lintels to support the upper work of store fronts, and we dare say most every contractor has oftentimes had a proposition of this kind to work out. The columns were, as a rule, selected from stock patterns—something that the local foundrymen happened to have on hand, to save time and cost of a new pattern, you know; consequently, the builder did not always know just what kind of a column, or how he was going to fit the woodwork to it, till he was ready to put it in. In the accompanying illustration are shown some of the ways we have used in our own work.

In Fig. 1 is shown a plain box column, with several openings in the back. These openings were usually oval shape and large enough to insert the hand. In that case, the woodwork can be made secure by having a few holes drilled and using stove bolts as shown.

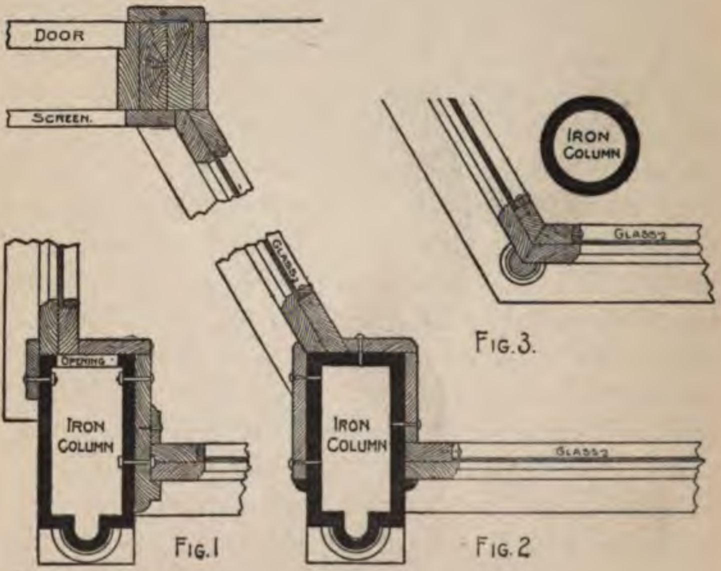


FIG. 3.

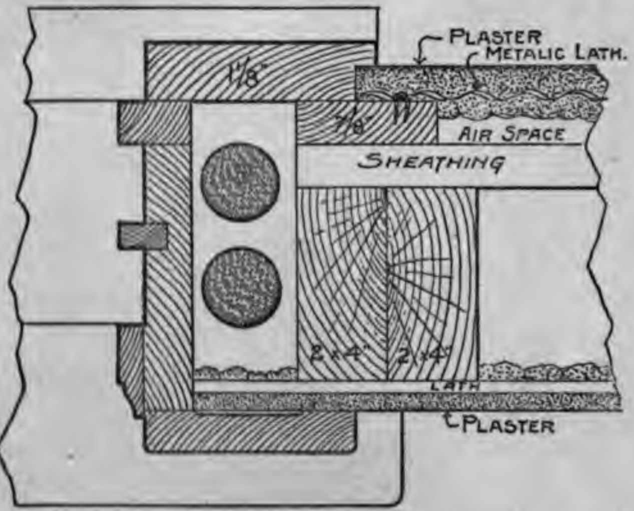
FIG. 1

FIG. 2

In this, the back is cast solid, and with quarter rounds cast at the sides, which serves as a stop for the face of the sash, and the woodwork back of the sash is made secure by means of lug screws. Now, since the casting is usually more or less rough and not suitable to take on a finish to correspond with the interior woodwork, it is a good idea to get out the boards that form the stops wide enough to cover all of the iron work that would show from the inside. However, this kind of construction is fast giving way to the more metropolitan style of large plate glass windows with the least obstruction to the view. Architects and builders are now being quite frequently called upon to prepare plans for remodeling such fronts as shown in Figs. 1 and 2, the columns usually being removed and the masonry work above being carried on steel beams. This generally requires reinforcement at the ends, or pilasters, because the weight, instead of being distributed along the front, as is the case in the use of columns, falls on the piers or pilasters. The frame work can then be built in entirely of wood or light iron work, and future changes can be made without shoring up of the front. This construction is usually for a 25-foot front. If it be a 50-foot front, then two plain, round columns should be used at either side of the angle, at the splay of entrance, as shown in Fig. 3. These columns are independent of the woodwork and should have a firm footing below and independent of the watertable. The latter can then be set at any time in front of the column and the woodwork fitted to it. There being no extra weight on the watertable at the columns, will always keep in alignment. The columns in a front of this kind are not objectionable, as they can be used for decorative purposes, and, if given a finishing coat of aluminum paint, they rather add to than detract from the appearance of the building. There are now on the market a number of patented devices for sash bars and angle columns, each possessing more or less merit, but it is not our purpose to talk about these at this time, but more to show what may be done with wood to give a clear, open front.

## Use of Metal Lath.

Question: Will you please give me some information on how to construct the walls of a frame house with 2 by 4-inch studding and shiplap for outside plastering? Should common or metal lath be used and should window and door frames be made different from those for a frame house with shiplap and siding?



Answer: We would prefer using expanded metal lath secured to strips as shown in the accompanying illustration. This gives a better clinch for the mortar than if the lath was stapled direct to the sheathing, besides it creates an air space and also a wider jamb at the windows, which is essential where large plate glass is used necessitating heavier sash than for the common double strength glass. It is a good idea to plow or groove out the corner of the frame so that the mortar will extend under the edge of the frame. The flashing of the caps can be put on in the usual way and plastered over. Of course, it would be much easier as far as the plastering is concerned to set the frames after the plastering is done, but it would not make as tight a job, especially to prevent leakage at the top. The frame work should be very substantial, otherwise a settlement or vibration will crack the plastering.

### Proper Stair Finish.

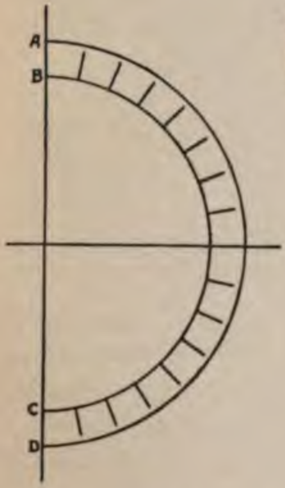
Question: I am putting in a flight of stairs from a room that is painted white. Would like your advice as to finish of stairs. Would oak throughout look well with the white? Please give your opinion on the subject.

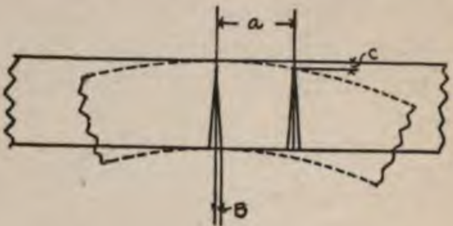
Answer: We should not advise the use of natural oak, but if oak finish is to be used for the stairs, a pleasing and effective combinatiowounld be to darken the oak with ammonia, or to use a sixteenth century effect, obtained by means of sulphuric acid diluted with an equal quantity of water. Forest green oak is also very pleasing in combination with white woodwork. Several manufacturers make green stairs suitable for this purpose, or the oak may be stained by dissolving verdigris in soft water or vinegar. Before using the stain on the actual work, try it on a small piece of the wood first. Mahogany hand rails and newels, with white spindles of a colonial design, always make an effective finish for a staircase that lead from a room or hall finished in white.

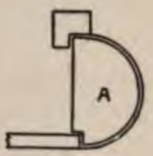
## Kerfing a Riser.

Question: Will you please tell me how to get the distance between the depth of kerf, to kerf a riser for the first step of a stairway; also how much must be kerfed to bend the riser the required slope?

Answer: In Fig. 1, the distance AD the outside of the riser is longer than BC the inside. When kerfing, enough must be taken from the inside to take up this difference in the lengths. There must be no binding or it is apt to strain the fibers in the face of the wood, and if too much is taken out in kerfing the curved part of the riser will be weak. When the distance between the kerfs is two or three inches a V shaped cut must be made, but it is better however to have the kerfs closer or they will show on the face. No rule can be given that will cover all cases as the spacing of the kerfing depends upon the kind of wood and also upon the thickness of the stuff. The workman must depend largely upon his own judgment for the different cases as they come up. A fairly good ratio between the radius of the curve and the distance between the kerfs is 1 to 8, that is the spacing of the kerfing about one-eighth of the raidus, not over that and less if possible. In Fig. 2, A is the distance between the kerfs and B should equal C. If it is desired to do the kerfing with one saw cut then by taking C equal to about half the width of the cut of the saw, the distance between the kerfs is approximately determined. When the radius is small it is advisable to do away with the kerfing in the manner shown in Fig. 3. A is a solid block or one built up and cut to fit the curve. The riser, where the curve begins, is cut down to about three-sixteenths of an inch and glued to the block A which is fastened to the floor.



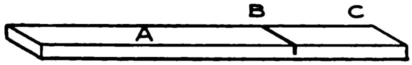


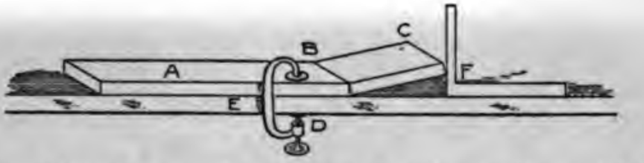


### Kerfing a Riser.

Saw kerfing is the simplest thing the mill man has to deal with, by the method shown with two simple illustrations, a piece of wood may be bent to any radius no matter how thick or thin the material may be, or how thick or thin the saw may be.

First—If for a circle to bend three feet in diameter take a piece of stuff about one and one-half inches wide as A and the same thickness of the



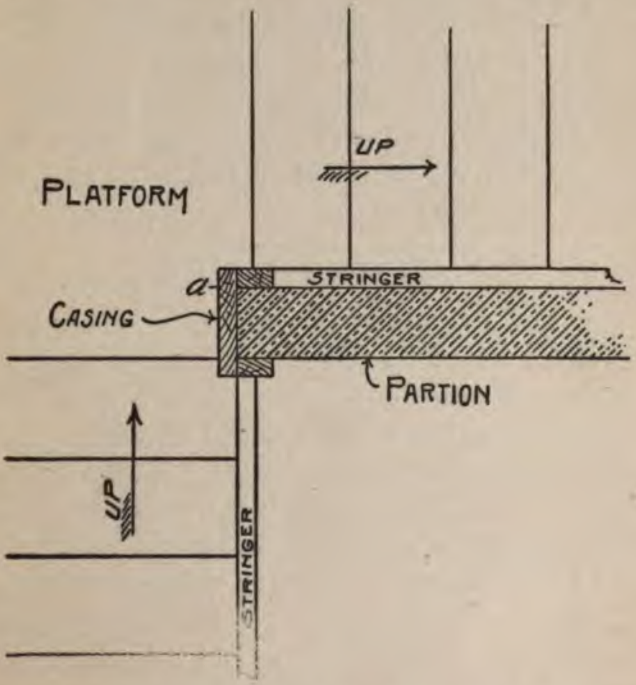


material to be used. Now take the radius which is eighteen inches and make a kerf that distance from the end as BC to the depth required.

Second—Clamp A down to the bench E close to the kerf and raise the radius end till the cut comes together tight, and take the height with the steel square F from top of bench to underside of piece. This will give the space between each kerf to bend the riser or anything that has a radius.

### Stair Construction.

Question: In finishing the base in column partitions is it proper to extend the base board and cap mould around the base of the pedestal, or butt base and moulding against the pedestal. In constructing open stairway where the stairs have a landing and the lower part of the stairway is open and the upper part is closed from the landing to the floor, how would you connect the stair string



with the angle newel, as in this case the string would come on the inside of the angle newel.

Answer: We propose the solution exemplified in the accompanying sketch of the inquiry submitted in which it is shown that we omit the angle newel in the intersection of the two flights at the platform. In place of which we continue the portion enclosing the upper flight far enough into the platform as shown at A to receive the stringer of the bottom flight. At the angle the portion is shown closed with stuff equal in thickness to the thickness of the stringers and the stringer of the closed upper flight which is on the inside of the portion will butt against the casing. The rail of the bottom flight will be fastened to the casing above the bottom stringer, while the rail for the upper flight will have to be fastened on brackets to the side of the portion and is known as a wall rail.

### Proper Moulding to Use.

**Question: I would like to have your opinion as to what would be the proper kind of plate rail and picture moulding to use in a dining room finished in quartered oak, finished natural. There is a dark green paper two-thirds from base up, and a grape-vine design from plate rail to ceiling. The painter suggests a white enamel plate rail and picture moulding, regardless of the woodwork.**

**Answer: White enamel plate rails and picture mouldings are undoubtedly a good deal used, they are, as a rule, suitable with dark paper only when all the woodwork of the room is finished in white, If the paper is light, then the plate rail may be white entirely, irrespective of the woodwork. In the present case, I should suggest using either an oak picture rail, or else to paint it in flat color (thinned with turpentine only) to match the green of the lower wall, or some shade of green in the**

upper-third. Another treatment would be to use flat black picture rail. The green, however, is most harmonious.

### Effect of Frost on Paint.

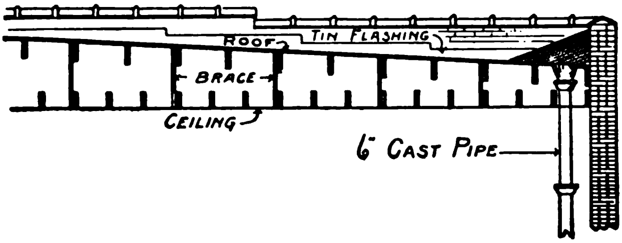
Question: What effect has frost on paint? Will it freeze and come off or what causes paint in cold weather to blister?

Answer: There is no reason why painting done in cold weather should not be as durable as painting done at any other season of the year, providing the surface painted is dry before it is coated. But if paint is applied over a surface covered with frost, the dampness enclosed by the paint film, is sure to cause trouble and the paint will peel or blister. When painting is done in the winter time, the work should not be begun until all traces of frost have disappeared and the paint should have rather more driers than for summer painting and should be thoroughly brushed out with a "pound" or 6-inch brush. The flat wall brush frequently used for the purpose of saving labor, is not suitable for winter painting.

### Roofing a Store Building.

Question: I have a flat roof to put on a double store building. Each store is twenty-one feet wide and sixty-four feet long with a center wall dividing them. I would like to have you advise as to which is the best way to put on a low pitched roof. Would you run all of the rafters to the center wall or to the outer walls?

Answer: The common way to roof a building of this kind is to slant the roof to the rear, giving a fall of about five-eighths of an inch to the foot, which in this case would be a fall of forty inches in the length of the building. Each joist is put on level, but set enough higher than the adjacent one to give the required fall. The gutter is usually a hanging one, but may be objectionable in some sections of the country on account of ice formed from melting snow. In that case it is better to run the water to one place and empty into an internal down pipe as shown in the illustration.



### Which is the Stronger?

Question: Which is the stronger for a barn, 2 by 6 studding set on 4-foot centers or two 2 by 6 spiked together on 8-inch centers?

Answer: Would prefer placing the studding on 4-foot centers. It is true the two studs spiked together would more than double the strength at that point, but in doing so the space between is robbed fo carrying strength for the hay load. The load, however, remains the same in either case, but where the carrying supports are on the lesser span the weight is more equalized.

### Stair to Fit Circular Wall.

Question: I would like to know how to lay the string out so as to fit around a circular wall in the following plan of a stair?

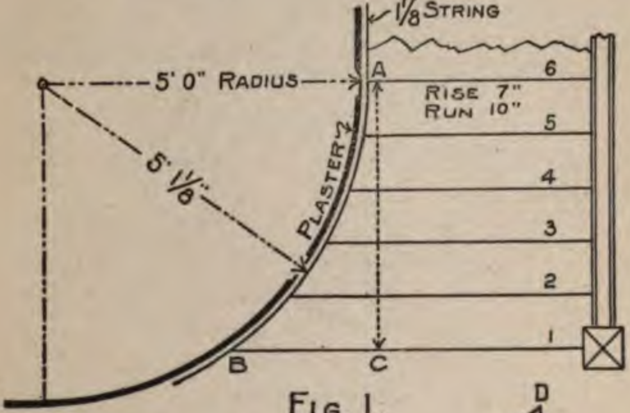


FIG. 1.

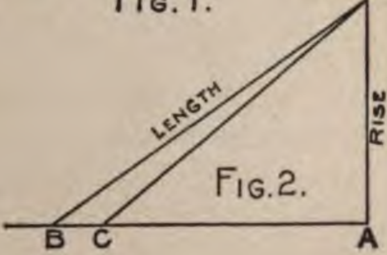


FIG. 2.

Answer: Measure the curve of the wall as from A to B taken at the floor line, as shown in Fig. 1, and this length will correspond with the natural run, as from A to C. To this set up the rise of the stairs, which in this case would be 6×7=42 inches, as from A to D in Fig. 2, and D to B will be the required length of the string. The back of the string can then be kerfed same as for the ordinary base, but the kerfs must be cut parallel with the risers.

These diagrams should be laid off full size, from which accurate measurement can be taken.

### Decorations for Dining Room.

Question: I am finishing a dining room in dark cypress with plaster panels to a height of three feet six inches, and am at a loss to know just what decorations would look best. What would you suggest?

Answer: The wainscot is formed by means of applied stiles and rails of cypress, leaving the intermediate plaster panels undecorated. These panels would look well if filled with either a plain or figured burlap or similar fabric in either red or green; or a Japanese leather paper may be used if the panels are large. Lincrusta could be used to give the effect of carving, and stained the same color as the woodwork. The upper part of the wall should be treated with a plain fabric or with a self-toned paper running up to about twenty-four to thirty inches below the ceiling, where it should be capped with a combined plate and picture rail, or a wider shelf, on which steins, ornamental plates or other bric-a-brac may be displayed. Above this the frieze may be hung with a figured paper in harmonious coloring or one of the pictorial friezes could be used. These can be obtained in many beautiful designs. Another treatment for this upper portion of the wall would be to use a plain ingrain paper of a lighter color than the side wall —for example, a light tan could be used with a red side wall—running this paper out some eighteen inches upon the ceiling, where it should be separated from the center panel of the ceiling by a narrow moulding. The ceiling could be tinted a deep ivory. Such a room would be refined in color effect, and would act as a pleasing background for any pictures or other decorations.

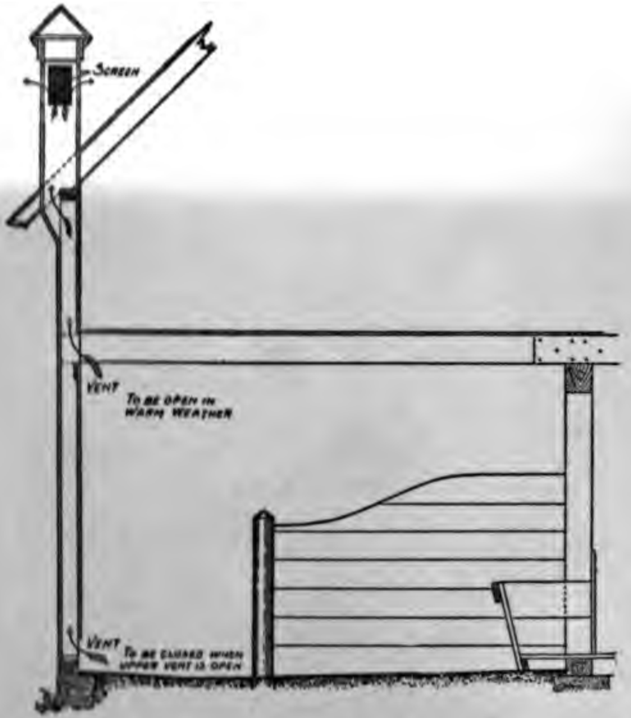
### Cause of Plaster Cracking.

Question: Please tell me what is the cause of the cracking of the plastering along the lath in a house. The plastering has been on for two months and has been fine up to a short time ago. About three weeks ago the house was overheated.

Answer: There are several causes for plaster cracking. The real cause in some cases is hard to determine without a personal examination. We judge that in this case it is due to shrinking of the lath, as the plastering seems to crack along the lath lengthwise. If the house was overheated the ceiling would get the most of the heat, as the tendency of heat is upward, which would produce a greater shrinkage of the lath. The lath might have been put on wet or green, causing extra shrinkage when dried out with extreme heat. Often the lath are put on in a stretch without breaking joints, which would make the ceiling more susceptible to cracking. Sometimes the plaster cracks because of not getting the right proportions when mixing the mortar. So if there happened to be a combination of causes the cracks would be likely to be a permanent feature of the job.

## Ventilating a Barn.

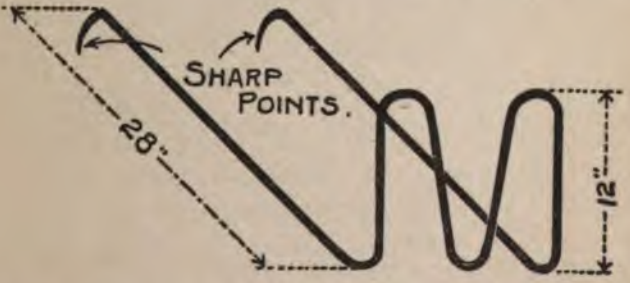
Question: Will you please give an illustration to ventilate a large barn without putting on the common roof ventilators, which are a nuisance in this part of the country on account of the sparrows and insects.


SCREEN
VENT
TO BE OPEN IN WARM WEATHER
VENT
TO BE CLOSED WHEN UPPER VENT IS OPEN

Answer: The nuisance caused by the sparrows and insects could be almost entirely avoided by screening the openings of the ventilator just the same as for the windows in a residence. As for ventilation from the stable part, this may be accomplished as shown in the illustration, which is simply done by boarding up the space between two studdings, boxing out at the cornice to clear the plate and finished with turret effect on the roof with screened openings on all sides. The interior openings should be as shown provided with slide shutters. Would have one of these vent shafts about every eight feet or opposite every other stall.

## A Device for Holding Shingles.

We show herewith a drawing of the most useful article in a kit of tools. It is for shingling where the roof is sheathed tight, and especially at the top in putting on the last rows of shingles. The object is to hold the loose shingles in convenient form for the workmen. The hooks are sharp and can be set anywhere on the roof or hooked over

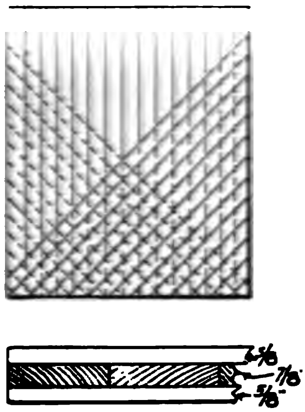


the comb. It is made out of ½-inch steel pump rod and any blacksmith can make them. A half dozen of these holders will be plenty for most anyone.

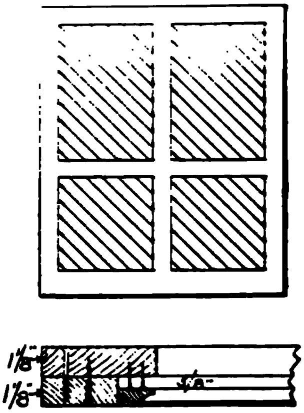
## How to Make Barn Doors.

Question. I am building quite a large barn and am siding with drop siding. Will you give the best method of making the doors so as not to take up too much room in thickness?

Answer. We herewith produce two sectional drawings with elevations suitable for barn doors.



SECTION
FIG. 1.



SECTION.
FIG. 2.

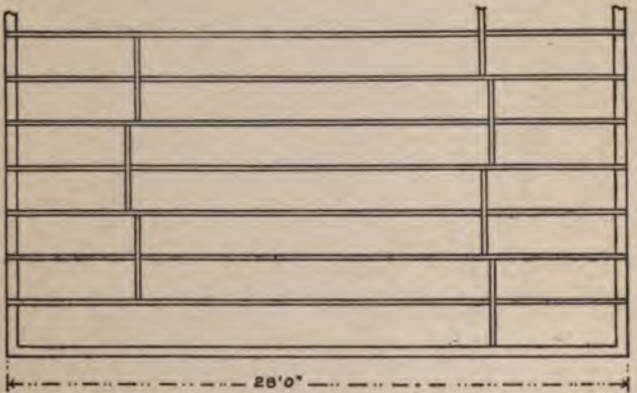
**The first is made of three thicknesses of boards as shown. The center is of ⅞-inch boards placed vertically and ⅝ ceiling placed diagonally on both sides, covering the whole space and well nailed. This will make a door 2⅛ inches thick.**

**The second is made of two 1⅛-inch pieces for**

the frame work lapped and screwed together. The panel work is made of $\frac{5}{8}$ ceiling cut in and nailed with a stop mould to cover the nail heads. Would paint all the laps and joints with white lead paint. This will make a door $2\frac{1}{4}$ inches thick.

### How to Brace a Roof.

Question: How would you brace a flat roof building 28 feet wide? The joist will have to be spliced at the roof and also at ceiling, as it is not desired to use columns to support the joist.

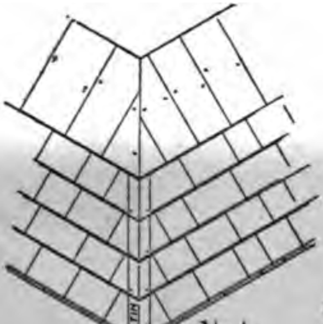


Answer: Judging from the above, there will be no other than its own weight to support, aside from snow that may collect on the roof. That being the case, would interlace the joist as shown, using joist at least 22 feet long. Placing the ceiling joist on 16-inch centers and the roof joist on 24-inch centers and spaced so that every other roof joist will be directly over a ceiling joist and brace with fencing alternately with a vertical and diagonal brace toward the center. Would use 2 by 10-inch for the roof joist and 2 by 6-inch for the ceiling.

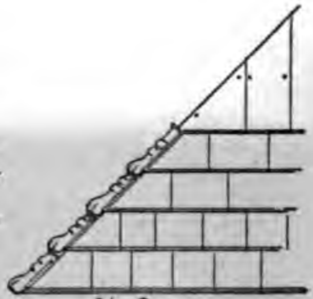
### How to Shingle Hips and Valleys.

Question: I would be pleased to have an illustration of the best way to shingle a hip or valley.

Answer: There are a number of ways of doing this work, but we think the best way is as shown



No. 1.

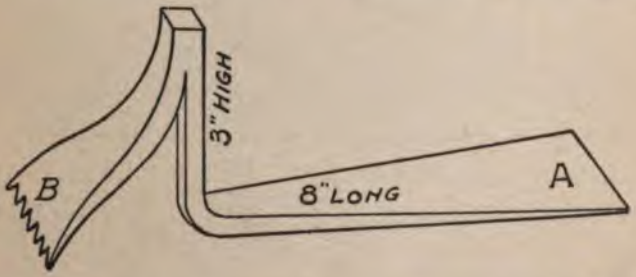


No. 2.

in No. 1 of the accompanying illustration, which is simply a piece of tin about four inches wide and long enough to reach up about an inch and a half under the course of shingles above. The tin should be bent through the middle to fit over the hip and the corners trimmed to fit the angle of the butts of the shingles. These should be put in as each course of shingles is laid. As for the angle to cut the shingles to fit the hip, that is best obtained by taking a bunch of shingles, say five or six, and tack them together with a slender nail and then apply the square with the same figures that gives the side cut of the jack rafter, because the shingle laying in the same position, the angle must necessarily be the same. This also applies to the corresponding valley. The tin for the valley should be not less than fourteen inches wide and of best quality, because it will be cheapest in the long run. It should be well soldered and given a coat of oxide of iron paint on both sides several days in advance of using, so as to give it a chance to dry. All flashing tins should be treated in this way. In No. 2 we show an ornamental hip shingle put on as described above. It is made of tin or galvanized iron and pressed as indicated. This makes a very ornamental hip ridge. These shingles are kept in stock at most up-to-date hardware stores.

## Roof Brackets for Shingling.

We print the following sketch of a bracket that has been used for the past twenty years, and always found to be safe and easily placed or removed. They have been used on roofs of various pitches, and they have never yet failed to stay where they were put, even on the steepest roofs.

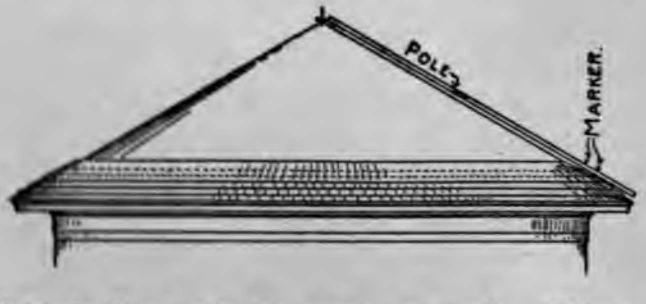


They can be made by a local blacksmith, the cost being about one dollar and a half per dozen. They are made from half-inch bar steel, shaped as per sketch, and drawn out thin at each end, the upper end, A, widened and thinned so as to slip under a course of shingles, while the lower end, or foot, B, is also drawn out and teeth filed so as to prevent slipping when in place. In these days of close competition, the best appliances are none too good, no matter what the work may be.

## Shingling a Circular Roof.

Question: Please give best method of shingling a circle roof and how to run the chalk line. Also is paint considered better than shingle stain and how should it be applied?

Answer: Trim the shingles so that their edges



will be in line with the center or peak. This can be done with a sharp hatchet at the time of laying. As to the chalk or gauge line, this can be had with a pole pivoted at the peak as shown in the illustration, and with a marker set at the desired pacing, each circle can be easily described as needed. Or after the first course is laid, the spacing may be had with a gauged hatchet. Opinions differ widely as to whether paint or stain is the better shingle preservative. In either case the butts of the shingles should be dipped to a depth beyond where the second lap will be. Most dipping as a rule is simply a farce. The object seems to be not how much, but how little covering. We have seen dippers take a handful of shingles and dip them five or six inches deep as though they were practicing a sleight of hand performance, not giving the stain time to properly penetrate the wood. After they were laid bright wood at the joints was exposed. Thus the place which most needed protection had none at all. As a protection to the wood we prefer dipping in boiling linseed oil, dipping not more than three shingles at a time with each separated between the fingers, giving two or three seconds' time to each dip.

### Finishing Bar Tops.

Question: How can I finish up bar tops both hard and soft wood, so they will have a finish that will not stain?

Answer: If the bar top is made of hard wood, it should first be filled with a good paste filler that should be stained to match the wood. If the natural color of the wood is not desired, it should be stained before it is filled. After the filler has become partially set, it should be wiped across the grain with burlaps to rub the filler into the pores of the wood and to remove any superfluous filler;

and after it has become dry it should be sandpapered lightly with the grain, and should then receive at least three coats of grain alcohol shellac. Each coat should be sandpapered lightly or rubbed with curled hair before applying the next succeeding coat. The final coat should be rubbed with pumice and oil until a perfectly smooth and level surface is obtained, and should then be polished with rotten stone and sweet oil. The treatment for a bar top made of soft, close grained wood is exactly similar to the above, except that the paste filler is omitted, the shellac being applied as soon as the stain has dried. Of course, if a water stain is used, the grain of the wood will be raised, requiring sandpapering after the stain is dry. To keep bar tops in good condition mix one part (by measure) of strong vinegar with two parts of boiled linseed oil, and after cleansing with lukewarm water, apply this mixture with a woolen cloth, well saturated, and rub briskly over all parts of the top until polished. Another method of finishing a bar top, whether of hard or soft wood, is to fill the wood with a paste filler, after first staining it if desired. And after the filler has been well rubbed into the grain of the wood and allowed to dry, the bar top is polished with any of the rubbing and polishing oils made for polishing furniture, or the mixture of vinegar and boiled oil may be used. It is well to apply this with a woolen cloth and then to polish by means of a piece of rubbing felt stretched over a wooden block that can be held comfortably in the hand.

### Painting a Shingle Roof.

Question: I have just completed a shingle roofed house. These shingles were painted about two months ago with ready mixed red roofing paint two coats, the second being put on about three days later than the first. The water caught from this roof tastes so badly that it is unfit for drinking purposes. Please let me know what is the best way to go about remedying it.

Answer: The ready mixed red roofing paint referred to is in all probability a paint made by mixing a mineral red or metallic paint, red oxide of iron, with linseed oil (probably more or less adulterated) with rosin oil or mineral oil, since this is the usual composition of such paints. While such a paint would undoubtedly give a disagreeable taste to the water for some time and would discolor it to a certain extent, there is nothing poisonous about it, such as there would be in any white lead paint that could be used. As a rule, it is better to avoid painting a shingle roof if the water from it is to be used for drinking purposes. Any additional coats of paint applied to this roof would add to the difficulty, and moreover the paint would find its way into the crevices between the shingles, causing little dams, which would hold back the water and rot the shingles. The present condition will probably disappear in the course of a month or two at the most. When the paint becomes powdered on the surface, it may be given a coat of hot linseed oil, but other than that we should not advise any treatment. Care should be taken in heating the oil to avoid fire. The best way is to put the can containing it into a large kettle of water, which is brought to a gentle boil over a slow fire. Cold raw linseed oil will answer the purpose, but will not penetrate the wood as well as hot oil. It might be well to add here that while dipping the shingles in creosote stain is found to preserve them, painted shingles do not last any longer than unpainted. Creosote, however, will give a very disagreeable taste to water taken from a roof where such stains are used.

## Filing a Saw

During an experience of many years at the carpenter trade I have, very naturally, made a few observations, and chief among them is the one pertaining to filing a saw; and I have long ago arrived at the conclusion that if there is any one thing that the great majority of carpenters are deficient in, it is the art of saw-filing.

It has always seemed to me that one of the first things a carpenter should learn how to do is to file his saw. I know that I had to file mine, although I nearly used up the first one that I tried.

Now, in regard to filing: When I see a man using his file as though it were a "hack-saw," I set him down as one who will never be a success at the business. A file is made so as to cut but one way; when you draw it back and forth you are not only needlessly wearing out your file, but you are spoiling the cutting edge of the teeth of your saw.

I have seen and tried several so-called "filing machines," but have never yet come across one that could compare favorably with hand filing by an expert. And why should not all carpenters, having good eyesight, be experts at filing? What would you think of a barber who could not sharpen his razor? You would not feel safe in trusting him to work for you, yet you will employ a man who calls himself a "carpenter," and allow him to haggle away at your lumber with a saw inadequate for the work for which it was intended, and wasting the time for which you are paying.

If the following instructions are noted, and carefully followed, I think that they may be of some benefit to perhaps a few of the readers of this book.

See to it that your saw has just enough set for the kind of work you are doing; just enough for the clearance, so that the saw will not bind, as too much set is nearly as bad as not enough. Next it should be jointed; by this I don't mean just running over the teeth with a flat file, but jointed with a "jointer." This tool may be purchased in most places at small cost, or can easily be made by fastening a flat mill-file in a hardwood piece, slotted to "straddle" the blade, thus insuring an evenness of the teeth. In jointing, all of the teeth should be touched, and if the saw is hollowing, it ought to be jointed till it is straight, even if some new teeth would have to be made. It would be far better if the saw was somewhat rounding, nevertheless, if straight, it would "pass inspection."

In filing a cut-off saw, much depends on the kind of wood to be cut; hardwood requires the teeth to have less "rake" and less bevel than soft woods. For use in soft woods I give the teeth quite a considerable rake, or pitch, and file at an angle of about thirty degrees, the handle of the file slightly depressed, and file toward the handle of the saw. There seems to be a difference of opinion among many as to which is the better way to file, some saying that they can make a saw cut better by filing to the point, I have tried both ways, and have found that I can do better work by filing toward the heel. But a good deal depends on the way a person commences; if he has become accustomed to file in any one direction he had better endeavor to become proficient in the manner that he accomplishes the best results. Care must be taken to hold the file at the same angle, and the same depression, throughout. Each tooth should be just brought to a point and not filed more; some of the teeth may require filing more than the one adjoining, and often the file will need to be pressed harder against that side of the tooth than the other. It requires "eternal vigilance" on the part of the filer to become an expert. Practice alone will teach the beginner how much he should file on either side. When he comes to file the other side of his saw he may have discovered that he filed too much on the first side; in such case the only proper thing to do is to file a like amount this time, even though it does cut some teeth more than just to a point, so that they will all have the same depth.

It may now be necessary to joint it again, perhaps to re-set it, and go over it carefully again.

After the saw has been filed there is a "wire edge" on the sides. The happy-go-lucky carpenter takes a slip, or an oil stone, and grinds off the sides of the teeth. The "practical" man takes his jackknife, or some such tool, and runs it along very lightly on the sides, trimming off that wire edge.

In filing a hand rip saw, I file square across, giving the teeth the proper rake, holding the file level. I file from both sides, after having set and jointed it as before stated. Having brought all the teeth to an even point, I then file the back of each opposite tooth at a slight bevel on the back, but being careful not to touch the cutting edge of the rear tooth. I hold the handle of the file slightly depressed during this operation. I have found that a rip saw filed in this way will cut well in nearly all kinds of wood.

In regard to files, I prefer a slim taper file, not too large, just a little larger than the depth of the tooth as the size of the file does not obstruct the points of the teeth so much. I have heard some men say that a large taper file makes a wider angle between the teeth; this is not so, as the angles of all taper files are the same, regardless of their size. The section of each is an equilateral triangle, and therefore the angles must be equal to each other.

There is another form of filing called "flem-tooth." To file those saws it requires a different operation, and a different vise, from ordinary filing. This method of filing is mostly used on fine saws, such as back saws, and requires but little set, and are used chiefly for sawing shoulders of tenons on fine work. In order to file a back-saw flem-tooth, I lay it flat on the work-bench, with a thin strip of wood under the blade, and secure in place by driving some small nails in the bench. I then file each side of the lower tooth, on both sides, to a "needle point," holding the file square across the blade, and depressed so that it will only just clear the back of the saw; after having filed one side, turn the saw over and repeat the operation. With a little practice one can file very nicely in this way, and have a saw that will cut keen when needed. No saws are better adapted to fine dovetail work than are these, and with care will last a long time without again filing.

### Constructing an Ordinary Stair

Question: Will you tell me how to construct an ordinary stair, especially how to miter treads and risers?

Answer: In an open stair, and especially one in which the treads project over the face of the string, it is desirable to have the work rather well finished in order to present an attractive appearance, one that will harmonize with its surroundings. In the modern dwellings of to-day the front hall or the stair hall is made larger than is necessary to accommodate merely the stair. The reception hall and stair hall are combined and appropriately so, but it is necessary then to finish the room more elaborately than if it were used as a stair hall only.

The object in the stair we are taking up is to avoid having the end of any piece of wood show. In order to accomplish this in the riser, the rise in the string is mitered and the end of the riser is cut on the same miter.

In Fig. 1 the different ways of mitering are shown. At (a) is a miter of forty-five degrees cut on both the string and the riser. This is the simplest method and the one more often used because of the saving in time. In (b) the riser has a shoulder to fit against the string and only the outside is mitered. This makes a more rigid joint. In (c) the miter is cut at the front as in (b) and the string is cut out to receive the remainder of the riser. Here the riser gets a stronger bearing upon the string, while in (b) only the front of the riser gets a bearing.

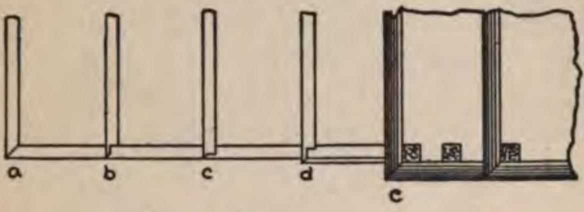


FIG. 1.

Where it is desired to make the face of the string more ornamental, a thin bracket is placed against the string, as shown in Fig. 3 at (g). When this is done, the riser must be longer than the thickness of the bracket where no bracket is used. This is necessary because the bracket is mitered to the riser. The cove under the nosing is placed upon the bracket just as it is returned upon the face of the string in the case where the bracket is not used. The lower front part of the bracket rests upon the returned nosing of the tread. In the best grade of work the brackets are glued upon the string, but ordinarily they are nailed on

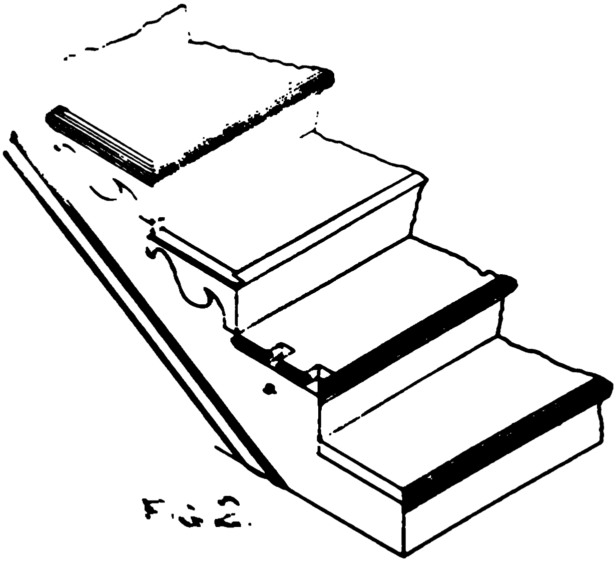


Fig. 2.

with brads which are then set and the holes filled with putty.

The return nosing is mitered at the front of the tread to fit the nosing over the riser. At the back of the tread a return is cut as seen at (m) in Fig. 2, which is a plan of (h) in Fig. 3.

When the balusters are in place the return nosing is nailed to its proper place and nail-holes filled with putty or a groove may be cut into it, as shown in Fig. 4. On the end of the tread, as seen in Fig. 2 at (a), a similar groove is cut and a thin piece of wood or tongue glued into the groove in the end of the tread. This tongue should properly have the grain of the wood run in the same direction as the grain in the tread. The return nosing is then

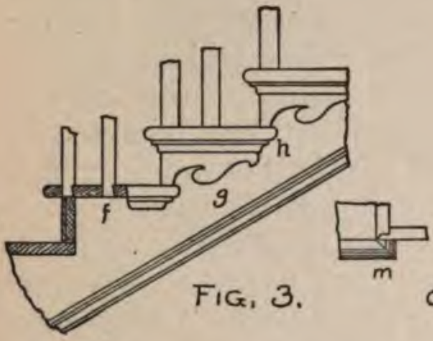


FIG. 3.

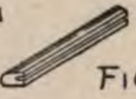


FIG. 4.

fastened into place by gluing the tongue and the groove and driving the nosing to a tight fit.

Another way to fasten the nosing is to cut notches on the underside of the tread and putting wood screws through into the return nosing.

A glance at Fig. 1 and 2 will show how the balusters are dove-tailed into the tread. The outside of the baluster should be flush with the face of the string and where a bracket is used, this must be considered the face of the string.

## Installing Furnace Pipes

We notice in the ordinary residence that the contractor or foreman makes no provision to take care of furnace pipes until the furnace man comes to put in the pipes, and then perhaps there is twice as much cutting to do as there would have been had the matter been give a little attention when it was most needed. The piping of a house for a furnace is a matter that deserves more care and consideration than it usually gets. It is a well-known fact that there are more or less furnaces put in that do not work satisfactorily. The fault is usually laid to the furnace or its maker. That there are some furnaces that are better than others is very reasonable, just as there are good stoves and bad stoves. But the best furnace ever made may fail if it is improperly installed.

Nobody would expect a watch to run if the balance wheel was gone, and you cannot expect a furnace to work satisfactorily if some essential point has been left out in its installation. By installation, we do not mean simply setting the furnace, but we mean the entire plant and system of pipes. A furnace may not be quite as delicate as a watch, but there are essential things about the working of a furnace that must not be overlooked if satisfactory results are to be expected. The free and easy circulation of air is undoubtedly the balance wheel that makes the furnace work satisfactorily.

Before going into further details regarding the furnace, we want to offer a few suggestions to carpenters and contractors in regard to setting studding and joists to accommodate the pipes. First, get all the registers located and marked on the plan. The architect should mark the location of the registers on the plan and the location of the furnace and the registers should be duly considered. They should be placed so as to keep out of the way of beds and not come too close to doors, and yet be where they can be reached by the most direct line possible from the furnace, and also avoid cutting the timbers of the house to any great extent. This makes quite a bit to look after, and enough to need some care in the location of pipes and registers.

No furnace pipe should be run up in a two by four partition; nothing less than two by six should be used, and if a large pipe, use two by eight studding where the pipe is put in. Many contractors use partitions with two by two where the furnace pipes are put in, but we do not believe this is good judgment—might as well get the studding wide enough in one piece and save the extra work of furring, and also the extra nails that the furring requires. Where there are partitions running parallel with the floor joists, it is common for the architect to specify double joists for such places. This, of course, is all right in its way, but if there are furnace pipes to go up in the partition they cannot be put in without cutting the joists half in two and perhaps more. A better way is to know just exactly the space taken up by the partition and set a joist up close to each side of the partition, so the furnace pipe can go between the joists and up through the partition. Pieces can be cut in so a plate can be put on top of the joists to set the studding on, and the plate would only have to be cut where the pipes come through, and this would give full strength to the joists, and if looked after at the right time could be put in quicker than any carpenter could cut out the holes for the pipes in the old haphazard way.

A very serious blunder in putting in a furnace is the lack of providing for the escape of the cold air from the rooms. Cold air is drawn into the furnace through the cold air duct, heated by the furnace and sent through the pipes to the different rooms in the house wherever it is desired. Stand over a register when the heat is turned on and you can feel a strong current of warm air coming into the room. It is the universal opinion and conclusion that the warm air coming into the room forces the cold air out, and by this process the room is heated. Now is it not reasonable to suppose that there should be a suitable place provided for the cold air in the room to escape? You cannot continually force air into a room unless there is some place for it to escape. Without this, when the room is full of air, the air in the room will hold back the warm air from the furnace, and the room will not heat satisfactorily and possibly not at all. We have seen houses with rooms that would not heat even when the pipes to all other parts of the house were shut off. Such a condition cannot be anything else but faulty construction.

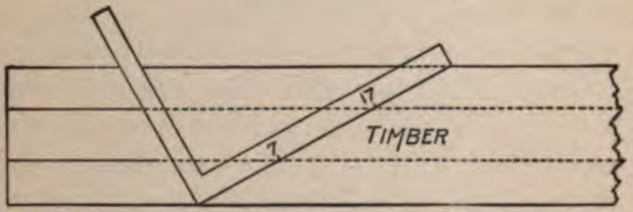
If you want to heat a house nicely, provide a cold air register of almost the same capacity as the warm air register for each room, and locate them in the best possible positions. Do not be satisfied with just an opening into a partition with a plate over it, for it is not right. See that each cold air register is of proper size and that it has a pipe of proper size leading either to a vent flue in a chimney or to a main cold air return pipe leading to the furnace well. It is a good thing to run a large cold air return pipe to the furnace well and connect the cold air return pipes from each cold air register with this. We mean this pipe to be entirely separate from the cold air duct to the furnace.

The main trouble is, people want things too cheap, and in order to cut down expenses they leave out all the flues and pipes that they can, and thus hundreds of furnaces are condemned every day, and all through the false idea of economy.

The furnace is all right; it's the way they are allowed to be put in that leads up to the trouble.

## Forming an Octagon

Enclosed find drawing and description of how to form an octagon from a square timber, which is



obtained by laying the square as shown and follow back seven inches from either end, and from that point to the corner of the timber set your gauge and size to that, and you will have an octagon timber.

If it be a tapering column, get the size at each end and apply the square by the same rule and take your points at each end and strike a line instead of gauging.

Remember it does not make any difference as to size of stick up to twenty-four inches square.

### Filing Saws

I take a cut-off saw, say No. 6 or 7, file it square across with the file level, then I start on the back corner of the tooth, say one-third to one-half way down, and file it to a point on the set side, which gives it a bevel point, but leaves the face square. I don't think it can be beat for the cuts I have mentioned. I file all my rip saws the same way, as it only takes a trifle longer, and if the timber is curly or knotty it cuts just as easy as if it was all straight grain, and it cuts just as fast and much smoother.

### Oiling a Floor

Question: Will you kindly tell me what to use to dry a floor on which two coats of linseed oil and drier (turpentine) have been used? The first coat of oil dried all right; by mistake the second coat was put on and it has taken over three weeks to dry; in fact, it is sticky and tacky yet. Can you advise me how to make a good finish?

Answer: It is practically impossible to get two coats of linseed oil to dry hard on a floor, in any reasonable time, if it will ever dry entirely. The only really satisfactory thing to do with the floor in question would be to remove the oil with ammonia or soda, afterward thoroughly washing the floor to remove the alkali, and neutralizing any traces that remain with vinegar. Then the floor should be sandpapered and the work begun anew. For an oil finished floor the best method to pursue is first to fill it with a good paste filler, which is allowed to set and then rubbed with burlap across the grain of the wood, to make it smooth. The best way is to take a strip of, say, five or six boards wide, and apply the filler; then go back and rub well with the burlap. After the filler has hardened for at least twenty-four hours, the floor should be oiled with crude oil or one of the specially prepared floor oils or rubbing oils, applying it with a rag and allowing it to remain for at least thirty minutes and then rubbing it well with a dry cloth. Such a floor can be maintained in good condition by an occasional oiling, in the same manner, which can be done by anyone and is no more trouble than wiping up the floor with water. If it is considered undesirable to remove the linseed oil with alkali, or some of the paint removers that are on the market, a coat of grain alcohol shellac might be tried, but this is at best only an expensive experiment.

## Proper Floor Draining

Floor drains, when used in cellar or basement, should be connected to leader side of a rain leader trap wherever it is possible. Some sanitary engineers go so far as to say that floor drains should never be used, their objection to them being that the floor is not washed often enough to furnish sufficient water to maintain a water seal at all times against sewer gas ingress, and their argument is well taken; but floor drains in a basement are very convenient, and are part of a well-installed sanitary sewer system.

In case of a seepage of water through the foundation walls, during a rainy period, it is well to be provided with some means to carry the water away

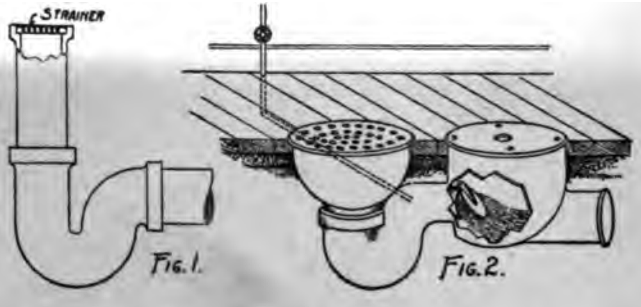


Fig. 1. Fig. 2.

quickly, without having to resort to the laborious (and oftentimes expensive) practice of pumping.

The evils of a floor drain are not so much due to their inefficiency as they are to the care taken of them. The cemented floor basement of the modern home to-day is just as important to be kept clean and sweet as the bathroom, and the thorough housekeeper takes just as much pride in it, and realizes the necessity for having it so from a sanitary standpoint at least.

The old method of installing a floor drain or floor outlet which consisted of placing a running trap in the line of drain pipe to the catch-basin, and running a piece of pipe to the floor level and simply closing the opening with a bar strainer grate, as shown in Fig. 1, is wrong. The grate, even when cemented into the hub end of the pipe, will in time become loosened, and dirt, sticks and other rubbish will soon clog up the trap and render it useless.

As we said before, the one great objection to a floor drain in the ordinary house, is that there is seldom sufficient water used on the basement floor to maintain a perfect water seal in the trap. To neglect to see that the floor drain trap is not always filled with water and to argue against its installation on that point only is wrong. Neglect renders many valuable comforts of life valueless.

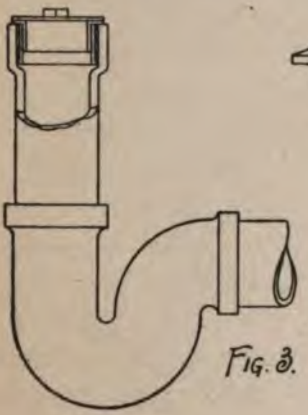


FIG. 3.

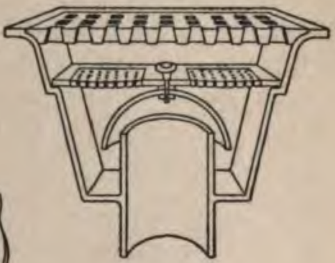


FIG. 4.

Floor drains should never be used without a back-water or tide valve, which will prevent sewer water from backing up into the basement. We show a number of different styles of floor drains in this article, which are built on the proper lines. The one shown in Fig. 2 is a combination floor drain and back-water gate valve. This accessible cleanout cellar drain flushing cesspool and back-water gate trap valve combination has much to be commended. It has a hinged strainer, through which seeping and floor waste water finds a direct outlet and sewer. The trap has a deep water seal, which is always desirable, and is always provided with a brass back-water gate valve or flap valve which will not rust and which will close and hold tight against a back flow from the sewer; it also has a tapped opening to which a water supply pipe can be attached, and by means of a valve being placed on the pipe at some convenient point, the drain trap can be thoroughly flushed and cleansed by simply opening the valve for a few minutes.

Another method oftentimes used to provide for a floor outlet to sewer is to run a piece of iron soil pipe from the trap on the sewer to the floor level, and to calk into the hub of the pipe a brass ferrule or thimble with a brass screwed cover, which is screwed down tight against a rubber gasket, as shown in Fig. 3. An outlet of this character is only opened when occasion demands, by unscrewing and removing the cover until its need is past.

In Fig. 4 we show an extra heavy cesspool suitable for barns, carriage rooms and places of like nature. The top is sixteen inches square, the body ten inches deep and has a four-inch outlet, suitable for calking into the hub of a four-inch iron sewer pipe; the top cover or grating is heavy enough to permit of horses, wagons and carriages passing over it. The second grating or strainer is of finer mesh, which catches any obstacles which might clog up the sewer; it can be lifted out by the knob and easily cleaned at any time. The deep water seal in this trap is one of its good features, the bell or hood not only serves to maintain a water seal, but where used in stables is a shield over the outlet to prevent oats or grain of any description which might fall through the second strainer from getting into the sewer.

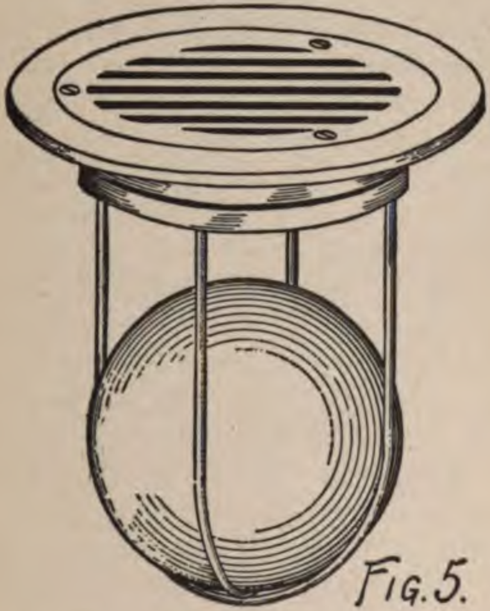


FIG. 5.

Care should be taken to prevent the bottom of the cesspool from filling up with fine strainings.

Fig. 5 is a combination floor strainer and back-water seal and is used in the hub of a sewer pipe which extends down to the trap placed in the sewer run. The rubber ball prevents the flooding of the basement from backing up of water, by being floated to seat above.

In Fig. 6 we show a floor drain and trap, designed especially for hospital operating rooms and other places where it is desirable not only to cleanse thoroughly the floor, but also to remove all sediment from the trap itself for obvious sanitary reasons. The trap is of cast iron, and is enameled inside. This gives it an impervious and smooth surface and prevents the trap from becoming coated and slimy. This trap is provided with heavy brass cast flushing rim and has a brass removable strainer.

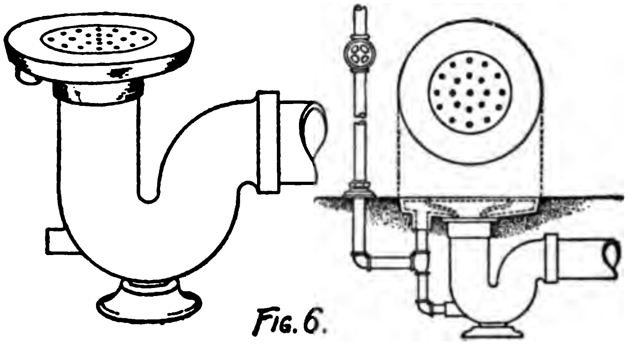


FIG. 6.

In the sectional cut, we show the method by which the water supply is connected to both the rim and trap, by means of which not only every portion of the body may be cleansed, but also all sediment removed from the jet inlet at the bottom.

The trap is built especially to maintain a deep seal and is three inches in diameter.

### Suggestions for Modern Decoration

Modern decorators are not content to follow the old and so-called historical styles, but have broadened out and are no longer bound by conventionalities. If they believe a certain combination of lines or colors has intrinsic merit in itself, it need not have the sanction of Greek or Renaissance taste, but it must stand or fall upon its own merits. It is true that in those of our public buildings in which the architect has followed some historical more or less closely, the decorator usually aims to keep his work in the same period, but when he comes to the homes of the people, it is no longer necessary for him to restrict himself to so limited a field, but he can search wherever he will for beautiful forms that may be adapted to decorative use.

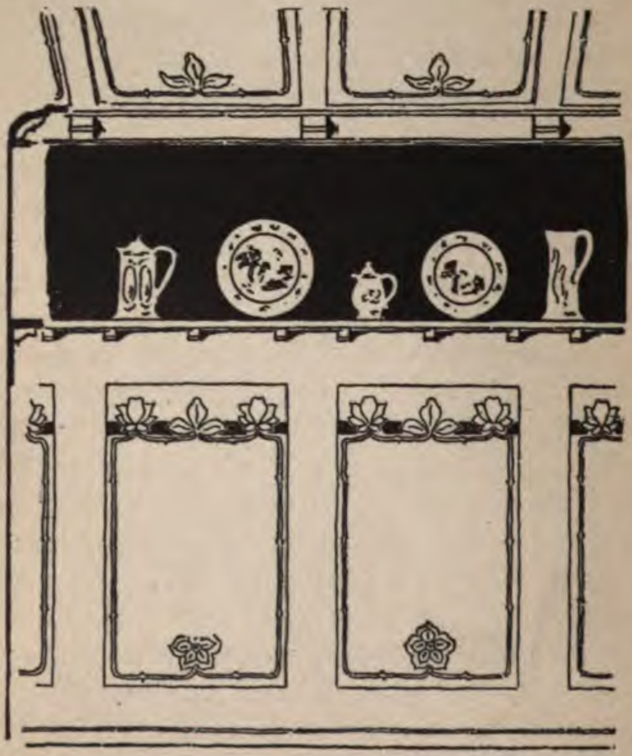
The modern English wall paper designers are particularly happy in this respect, and they adapt the most commonplace things to decorative purposes. For example, one of the recent pictorial friezes produced by a leading English wall paper manufacturer represents a view of the River Thames above London, with one of the typical English river steamboats as a prominent part of the picture. Who but an Englishman would ever have thought of considering a steamboat as a fit subject for decorative design?

In modern house decoration the decorator avails himself very freely of mouldings, applying them over the plastered wall simply for ornament and employing them to separate the various divisions of his decorative scheme. Not only are these mouldings used for the side wall, but they are applied to the ceiling as well, and one manufacturer of decorative room mouldings has offered to the trade the necessary mouldings to produce the effect of a deeply beamed ceiling, or a heavy paneled wooden ceiling, the whole thing being

merely tacked to the plaster by means of thin wire nails. Such moulding as picture mouldings, plate rails and the like, which at one time were made a part of the carpenter's specifications and were put up by him with no regard whatever to what was to follow in the way of decoration, are now almost always left to the decorator and the carpenter has nothing whatever to do with them.

In this connection we offer a couple of suggestions for decorations that may prove useful either carried out as they are, or may be used as suggestions for other treatments.

The first is well adapted for a hall treatment and is intended to be carried out in fabrics in combination with mouldings and stenciling. For about three-fourths the height of the room the walls are to be paneled, after a rich, warm, brown burlap has first been hung upon them. Wide, flat mouldings are used to form the stiling of the of the panels. Then the stencil ornament shown in the illustration, or some other suitable design, is stenciled upon the burlaps in a deep red. The frieze is carried out in natural burlaps, the stenciling being done in a light yellow brown. The ceiling angle is broken by a heavy wooden cornice. The mouldings may either be finished in fumed oak, or in the dark, almost black, Flemish oak, or they may be stained a forest green or sealing wax red, with good effect. One curious feature of the stenciling is that the pattern is carried right through as though it were continued back of the stiling. A similar idea would be quite effective in the case of stenciled ornaments on doors, a treatment which deserves more recognition than it usually gets at the hands of decorators, who leave the doors as great blank spaces of monochrome in the midst of a highly decorated wall.



Another effective method of carrying out a hall decoration of this character would be to use a figured burlap or a lincrusta or some similar material that is made with ornament in low relief, for the panel fillings. In that case it is not necessary to stencil any ornaments. The upper part of the wall could then be hung with a paper or a burlap having a small set figure powdered upon the background.

The second suggestion is for a dining room decoration. Unfortunately the necessity for rendering this sketch in black and white, in order that it might be engraved, takes away from its effectiveness. In carrying out this design, the lower portion of the wall is paneled with wide, flat oak boards, using a rich bright red for the panels. The border design is stenciled on in shades of green, with the flowers in a dull yellow tone, taking care that it does not clash with the red background. The oak woodwork is stained a forest green, or may be finished in black Flemish oak if desired. A shelf rail, supported by brackets, serves as a resting place for odd bits of pottery, which stand out against a plain background of dark green burlaps. The ceiling is also paneled, a bracketed cornice breaking the angle. The ceiling panels are filled with bright red buckram, lighter in tone than the dado panels, and the border is stenciled in green bronze. Other color treatments will suggest themselves according to the amount and character of the lighting which the room receives and the colors desired for the draperies and furniture coverings. Another color scheme, for example, would be to stain the oak mouldings a rich red, making the dado panels a light green and the upper wall a warm brown. A very effective treatment, although somewhat expensive, would be to gild the oak on the unfilled wood with leaf gold, using the brush to force the gold well down into the grain of the wood. This gilded surface is then given a glaze coat of asphaltum to soften down its brightness. The dado panels and the ceiling are strong red and the upper wall is a dull blue.

Suggestions of this kind are intended primarily to show the possibilities that are open to the modern decorator, who finds himself absolutely unhampered by precedent in the choice of decorative forms, colors and materials with which his ideas are to be carried out. Recent years have brought so many beautiful decorative fabrics, such as burlaps, grass cloths, finely woven matting, buckram, imitation leathers and similar materials, that it is no wonder that the wide-awake decorators who are alive to the possibilities of all these new things should have struck out for themselves along new lines and should be producing decorative effects that are not only new and novel, but have every element of good taste as well.

## Cellar Drainer or Water Elevator

Very often it is necessary—and it is always a good practice—to drain the soil around the outside of a foundation wall. Sometimes it is thought impossible to do this, owing to the fact that the sewer is higher than the level of the drain.

To drain cellars, wheel pits, furnace, cesspools, etc., removing waste water from kitchens below the level of the sewer, drippings from ice-boxes and for any purpose where it is necessary to remove water economically from one level to a higher one, the automatic cellar drainer (of which there are several makes on the market) seems to answer the purpose on a small scale very satisfactorily.

Taking the minimum pressure outside of Chicago, i. e., 40 pounds to the square inch, a small cellar drainer has a capacity of four hundred gallons per hour, and is made in larger sizes up to a capacity of fifteen hundred gallons per hour. With additional pressure, it will throw, proportionately, a greater amount of water.

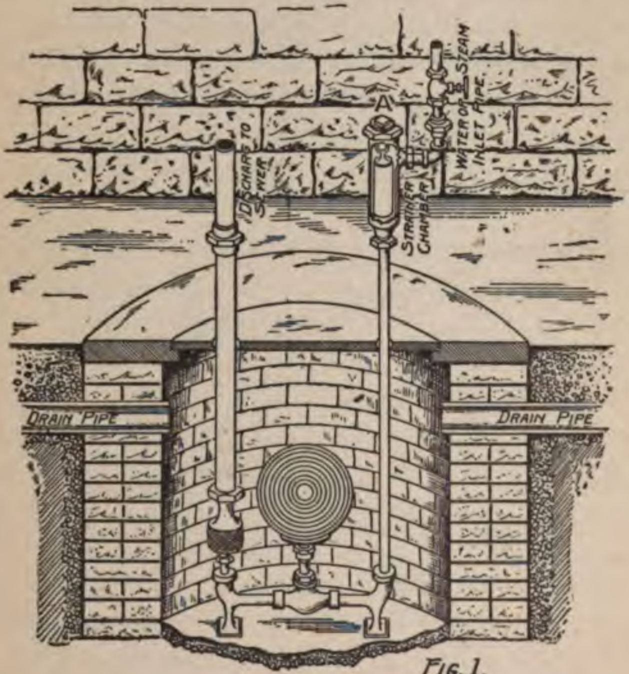


FIG. 1.

A cellar drainer of this type will elevate seepage water one foot for every five pounds of city water pressure.

In Fig. 1 we show the arrangement of valve and unions, and it should always be installed in this way, so that the drainer can be disconnected and taken out of the pit any time to be repaired and cleansed. A swinging check valve should be placed at the discharge pipe, should there be any possibility of back water getting into the same while in the cut we show a brick pit which is substantial and lasting. A very good strainer pit is made of an old barrel, with a few holes bored in the side and bottom of same. In operation, a drainer of this type performs its functions by passing water or steam under pressure, through the drainer point or jet, thus creating a suction which draws the water from the barrel or pit in which the drainer is placed into the discharge pipe, and both the jet water and the cellar water are discharged together. As long as the city water or steam passes through the drainer point or jet, this suction and discharge is continuous.

The accumulation of water in the barrel or pit raises the float ball gradually, and when the water has accumulated about eight inches in depth, the float ball opens the supply valve. When the water has been removed from the barrel or pit, the valve is closed by the ball dropping back and closing the valve, and the drainer becomes inactive until the water again accumulates, when the valve is opened and the water is discharged as before.

This drainer can also be purchased without the automatic attachment and is used where there is always somebody to attend to same, and is not to be recommended for cellar or any place where water accumulates unexpectedly or irregularly.

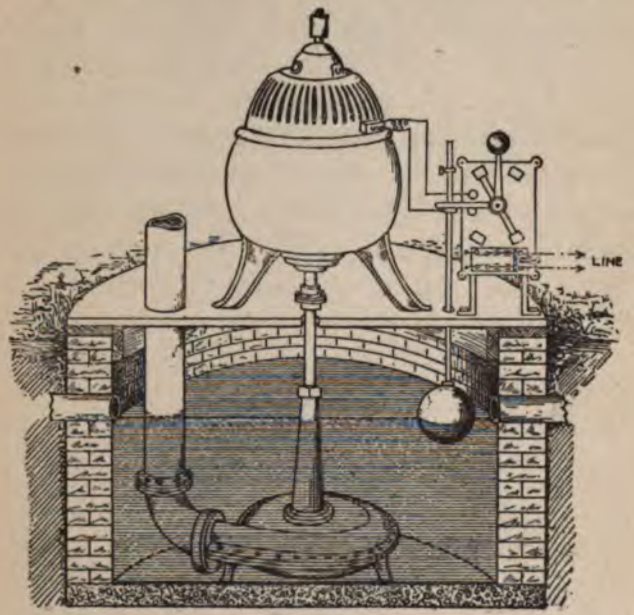
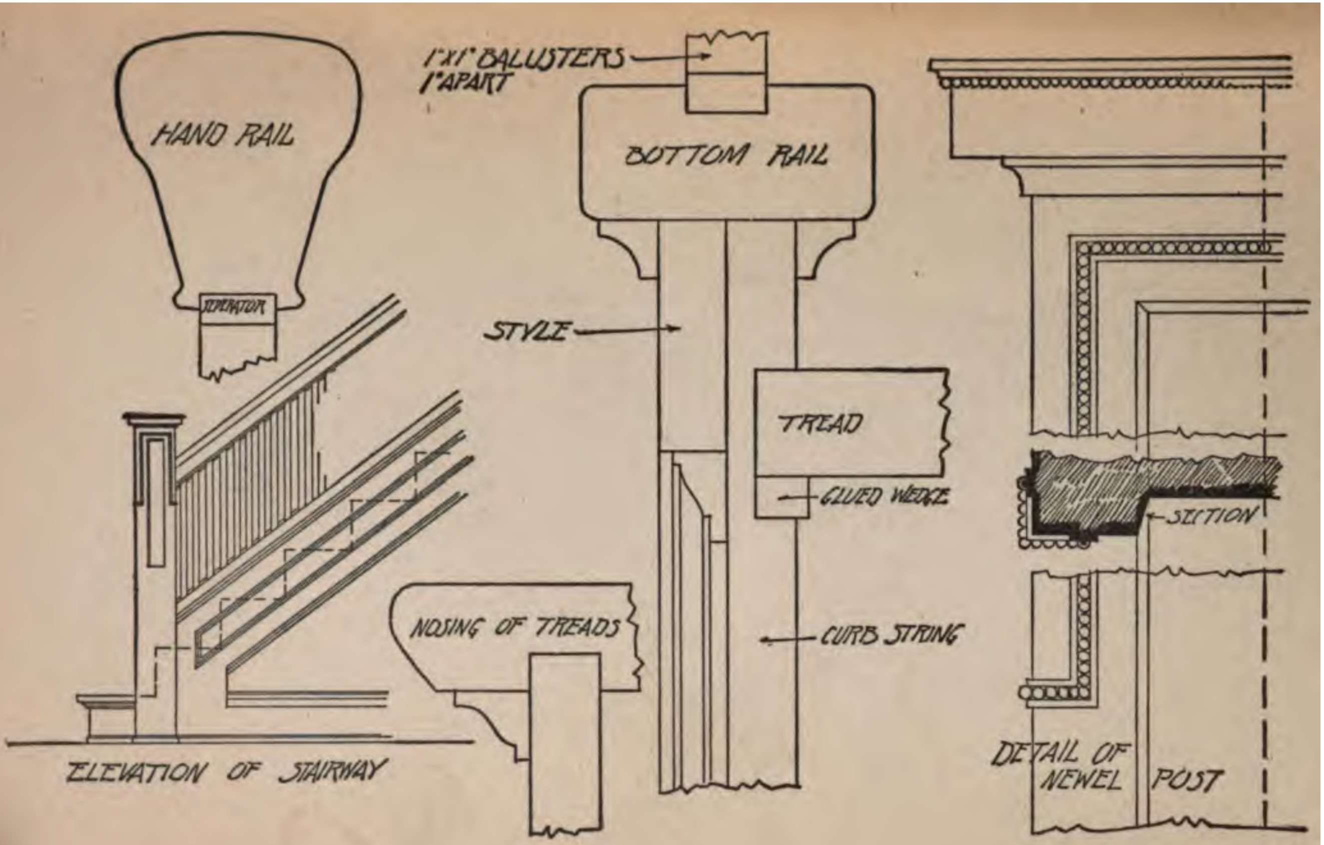


FIG. 2.

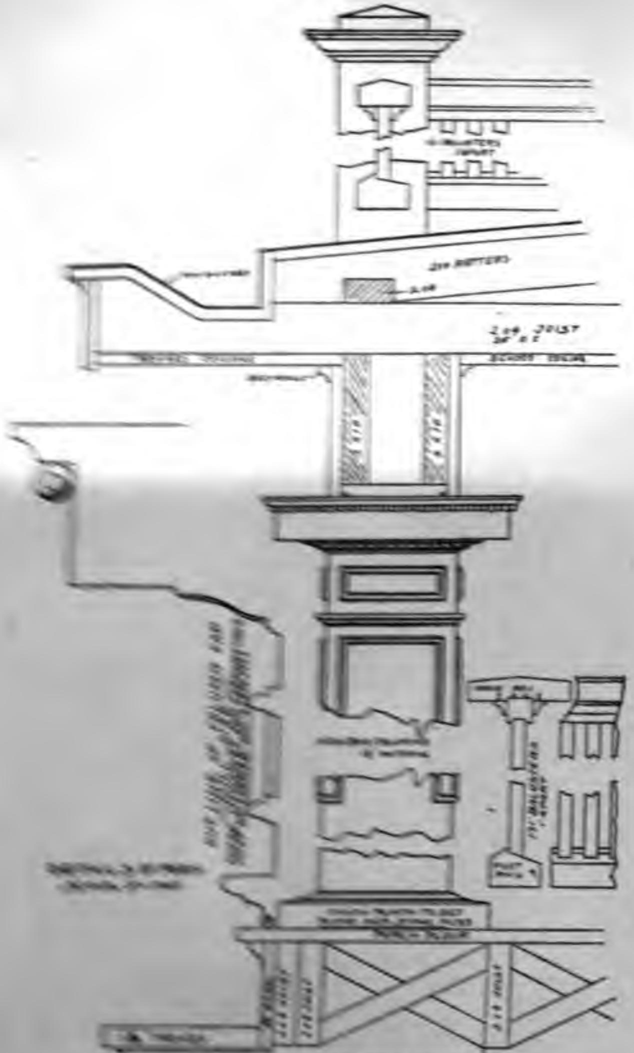
This type of drainer or elevator is especially adapted for light work.

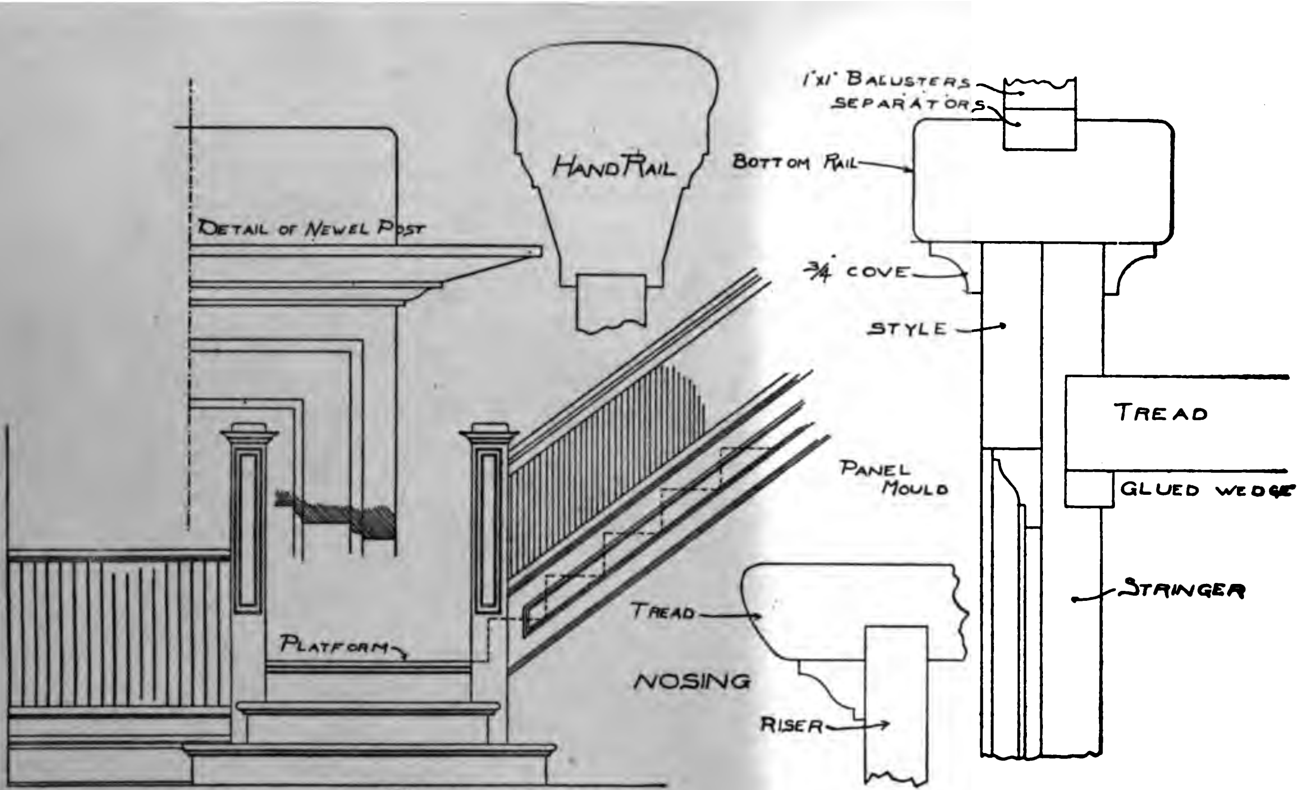
In Fig. 2 we show an electric ejector or Bilge pump, which can be had to meet any conditions or capacity necessary, while the first cost, including cost of installation, is greater. The expense of running it is very slight. The operation of this device is that the water rising in the pit raises the



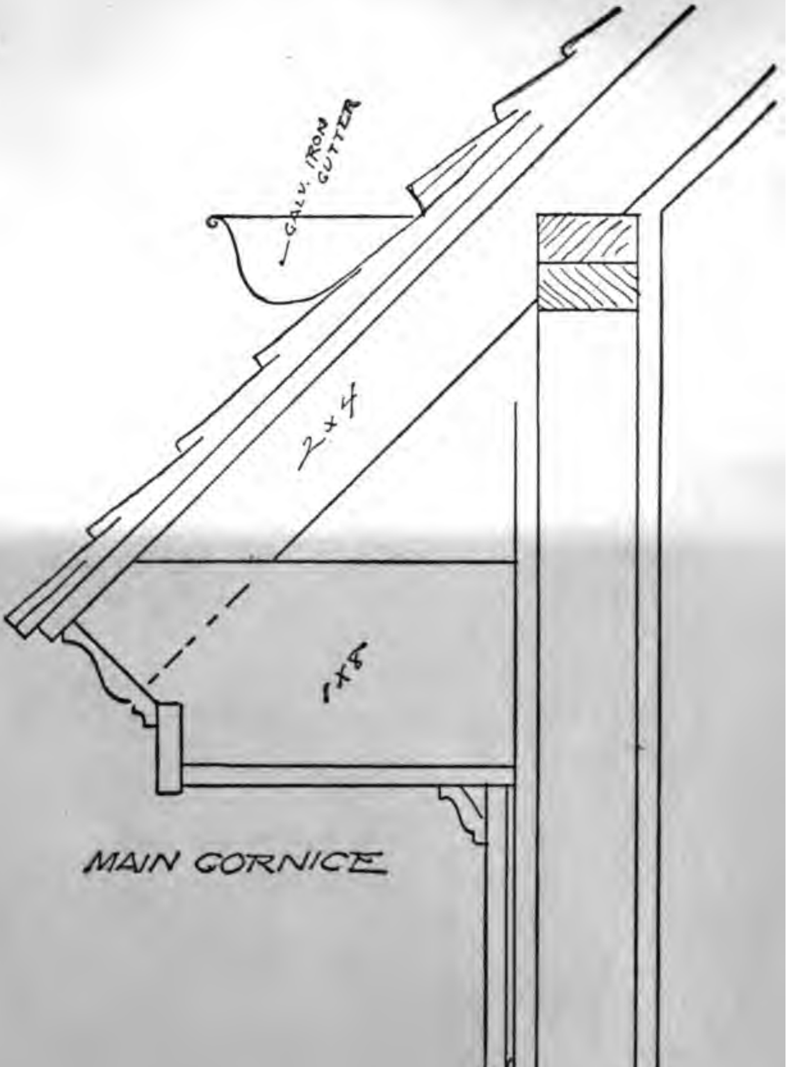
ELEVATION OF STAIRWAY

DETAIL OF NEWEL POST

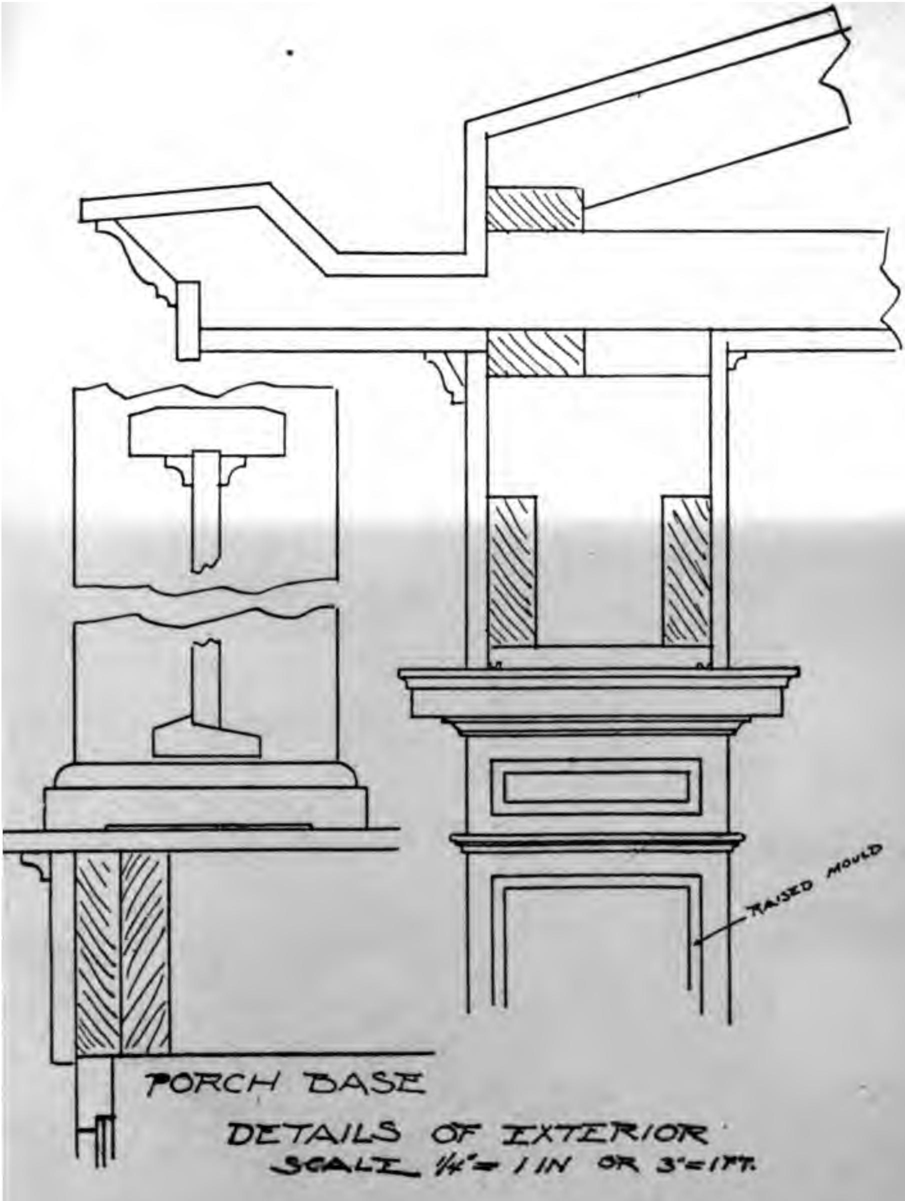

2x4 JOIST



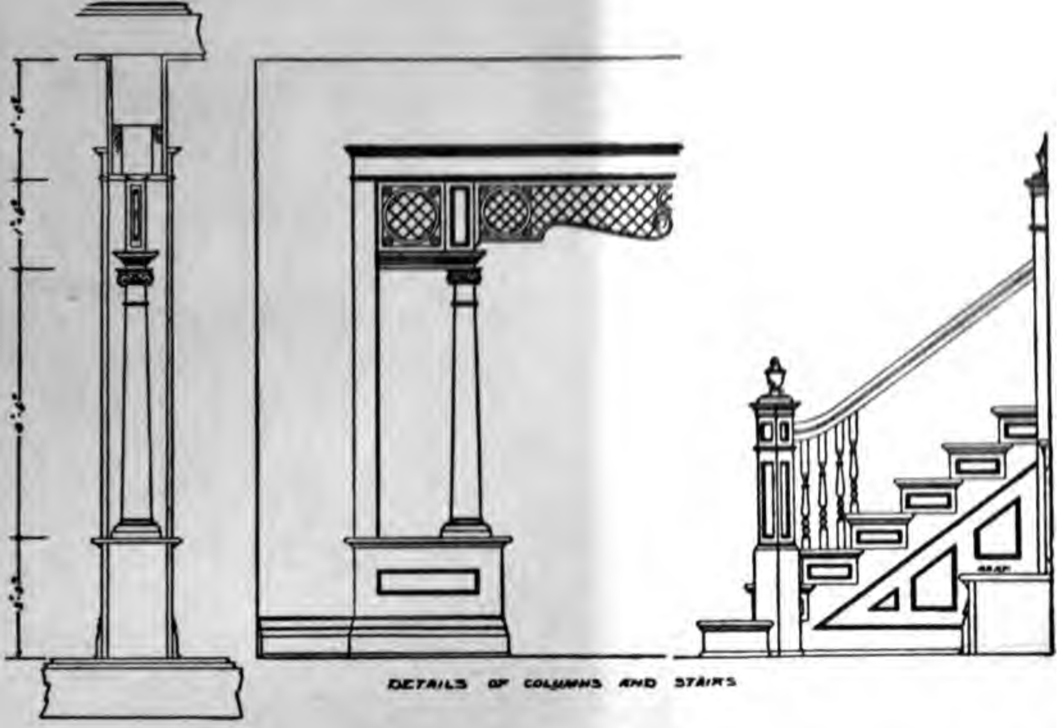
Detail of Stairs
Scale 1" 1" = 1 Foot



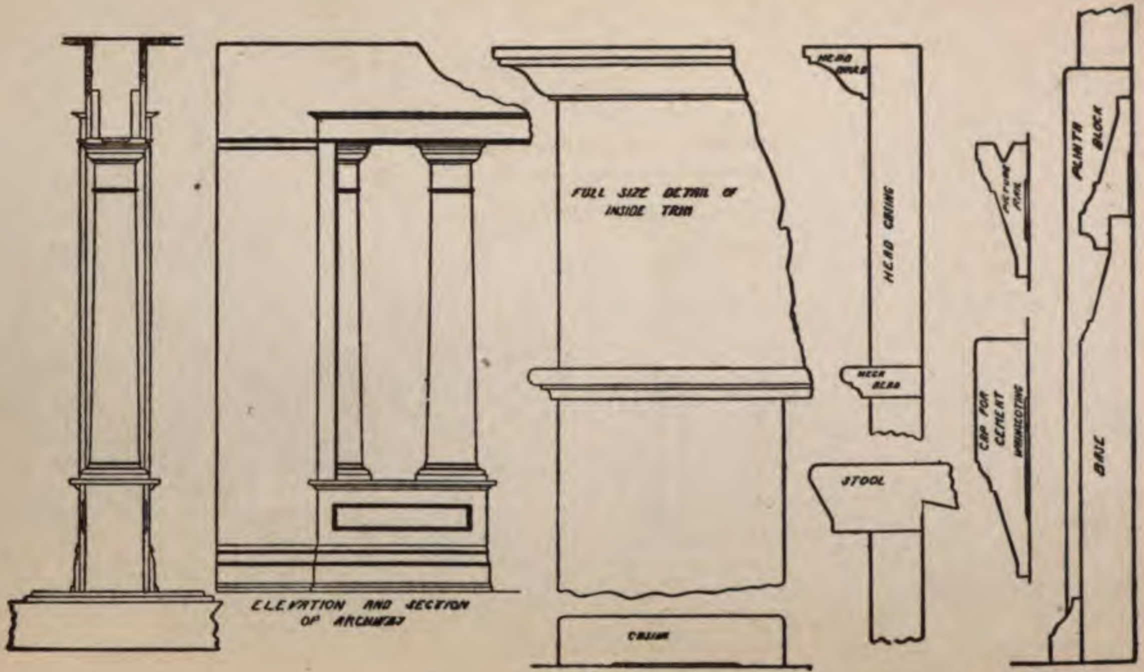
MAIN CORNICE

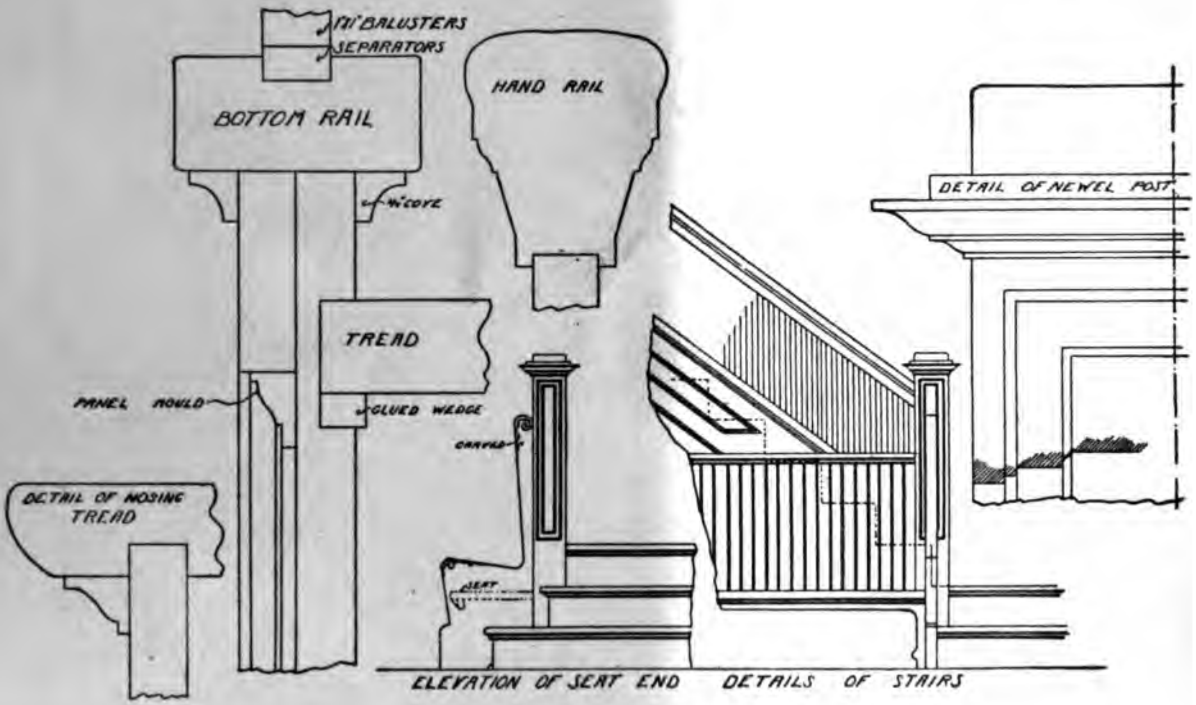


DETAILS OF EXTERIOR
SCALE ¼" = 1 IN OR 3" = 1 FT.

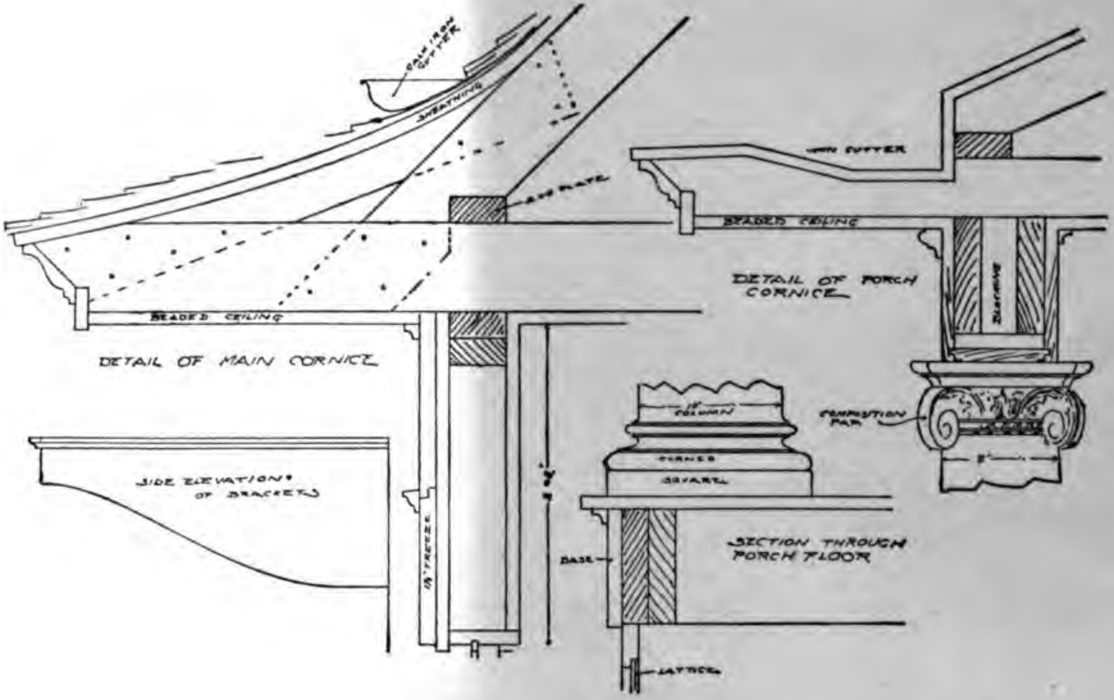


DETAILS OF COLUMNS AND STAIRS

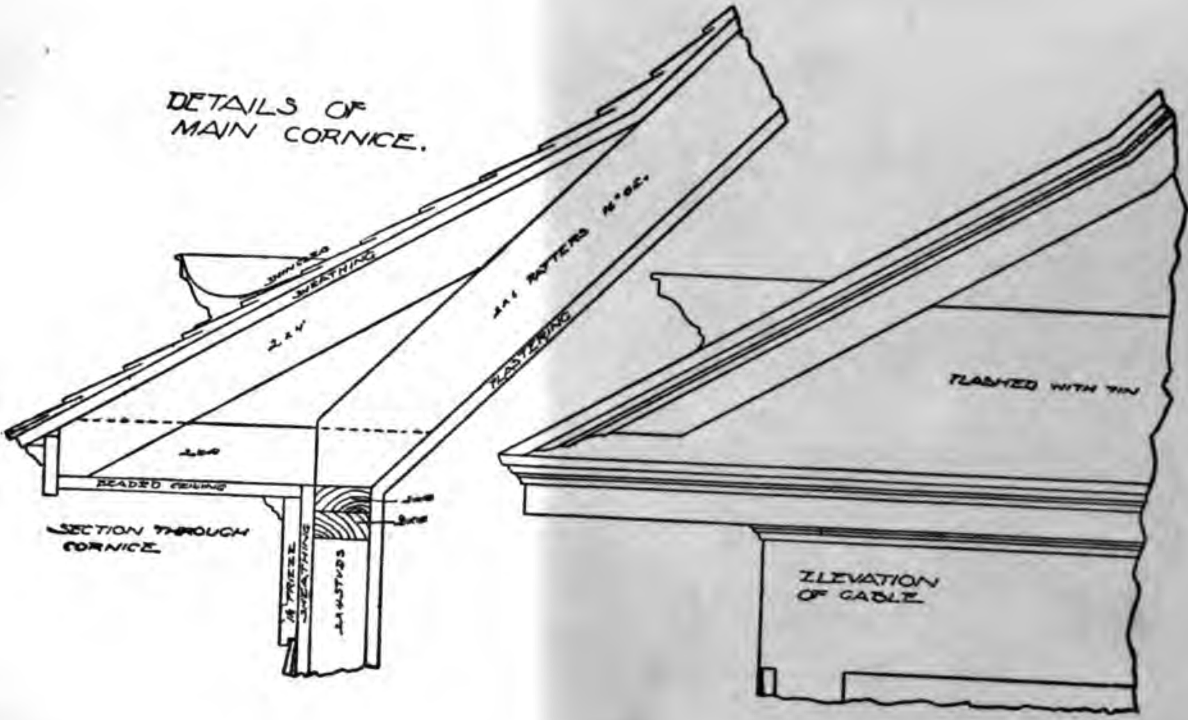

ELEVATION AND SECTION
OF ARCHWAY
FULL SIZE DETAIL OF
INSIDE TRIM
CASING
HEAD MOLD
HEAD CASING
NECK BEAD
STOOL
PICTURE RAIL
CAP FOR
CEMENT
WAINSCOTING
PLINTH
BLOCK
BASE

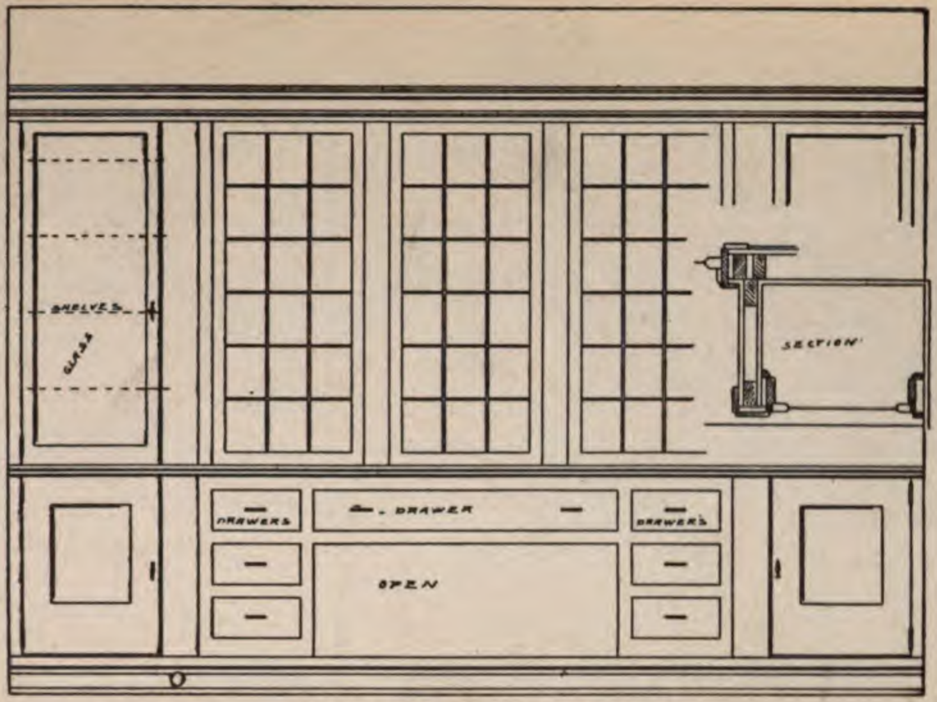


DETAILS OF STAIRS

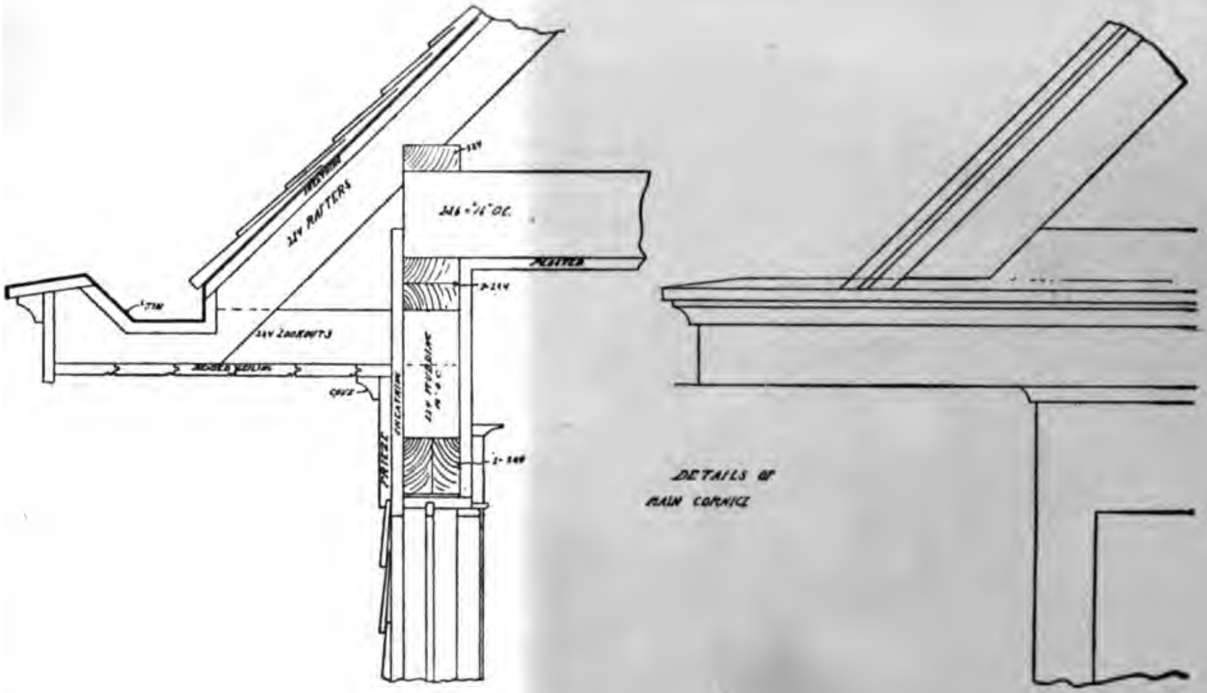

GALV IRON GUTTER
SHEATHING
2x6 PLATE
BEADED CEILING
DETAIL OF MAIN CORNICE
SIDE ELEVATION OF BRACKETS
1⅝" FREEZE
BASE
LATTICE
10" COLUMN
TURNED
SQUARE
SECTION THROUGH PORCH FLOOR
TIN GUTTER
BEADED CEILING
DETAIL OF PORCH CORNICE
BLOCKING
COMPOSITION CAP
8"

# DETAILS OF MAIN CORNICE.

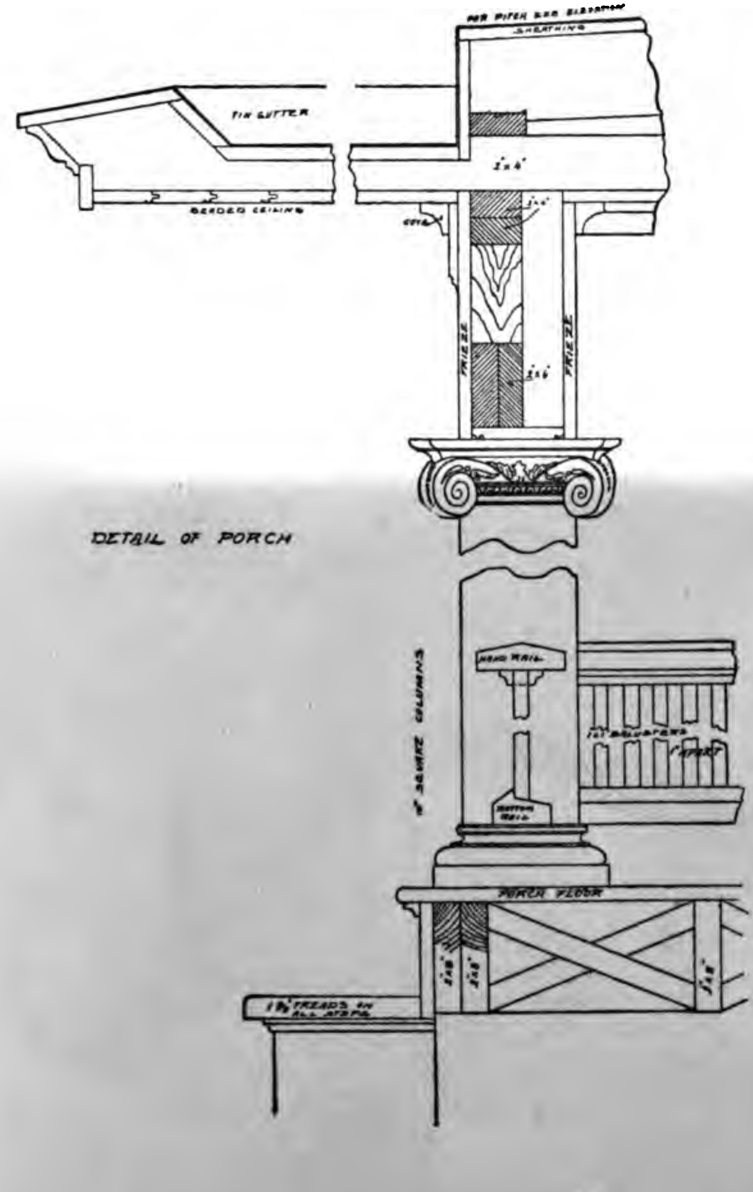




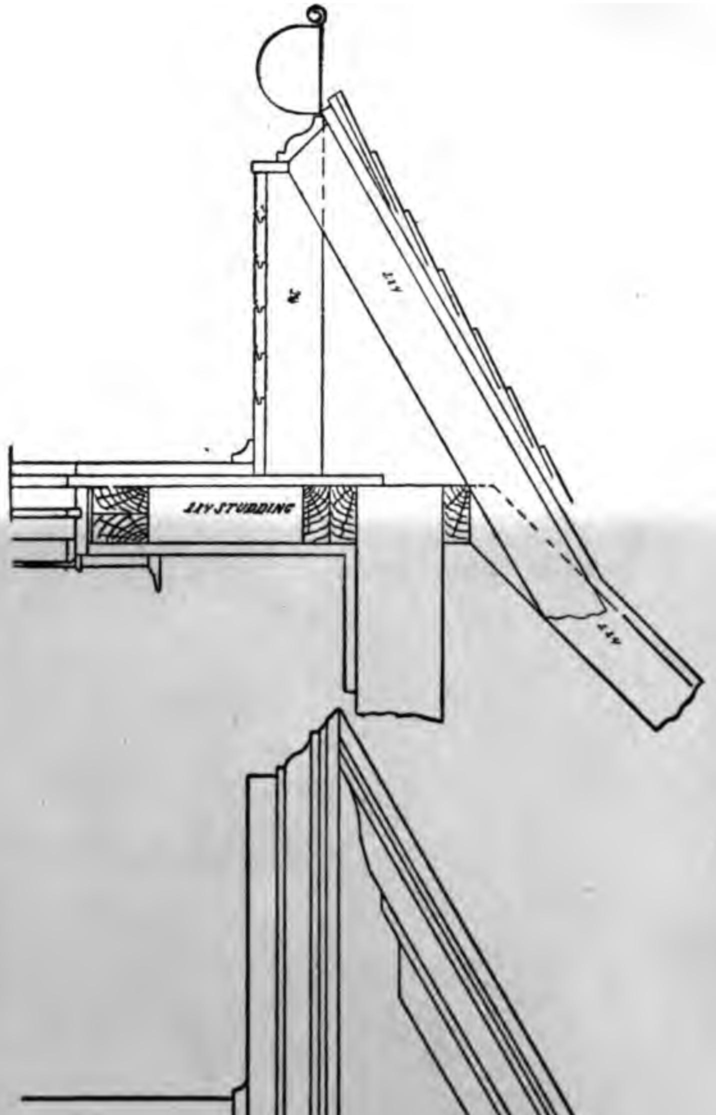
ELEVATION OF DRAWER CASE

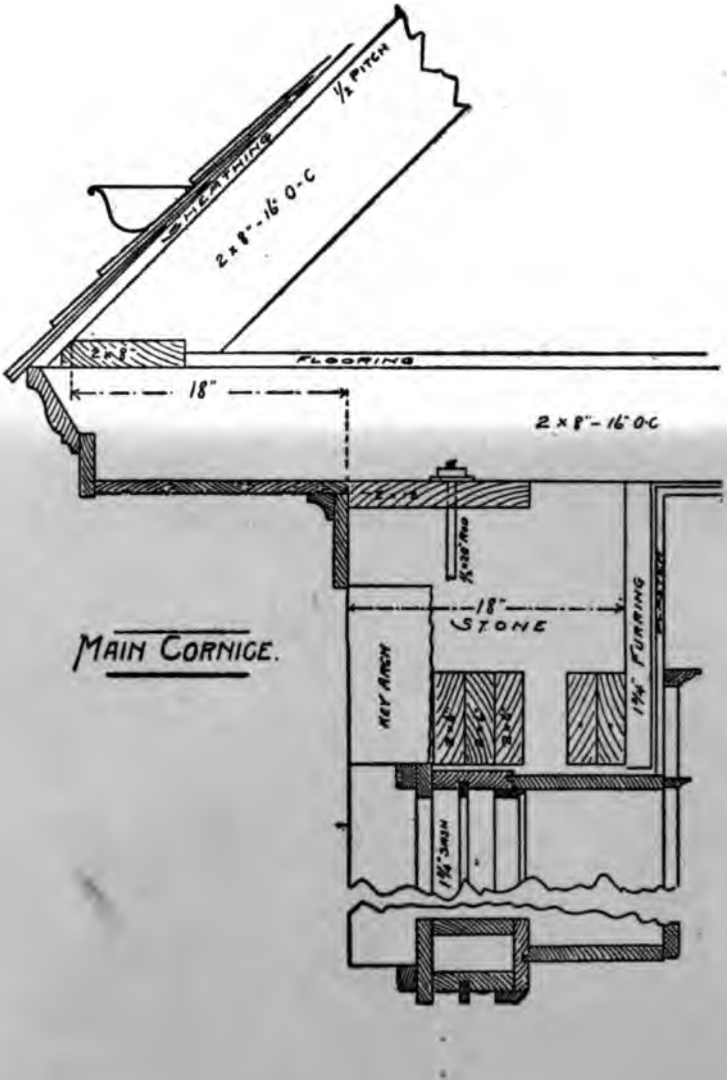


DETAILS OF
MAIN CORNICE

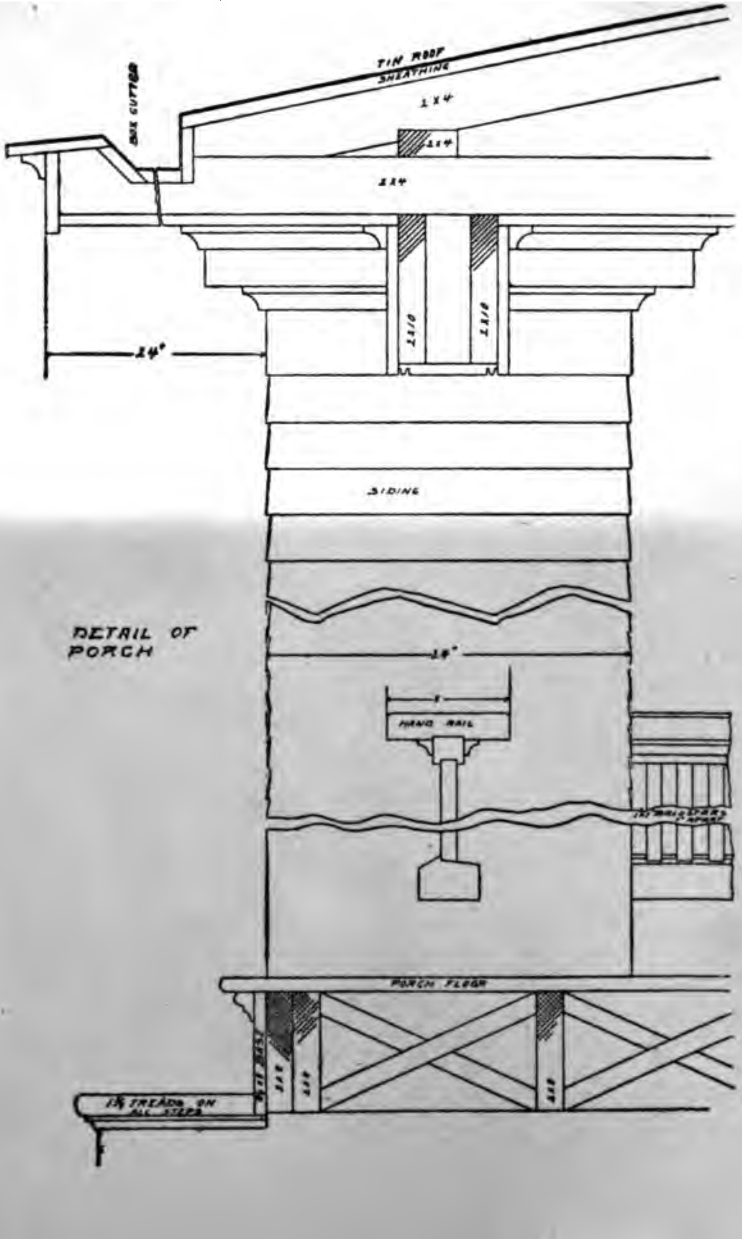


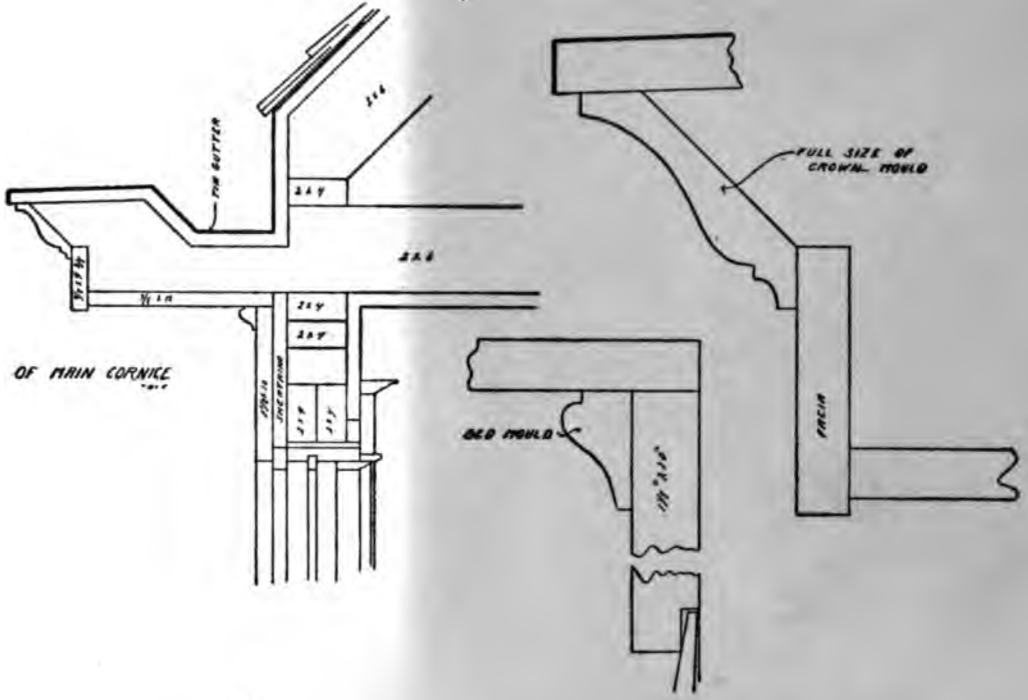
DETAIL OF PORCH


2x4
2x4 STUDDING
2x4

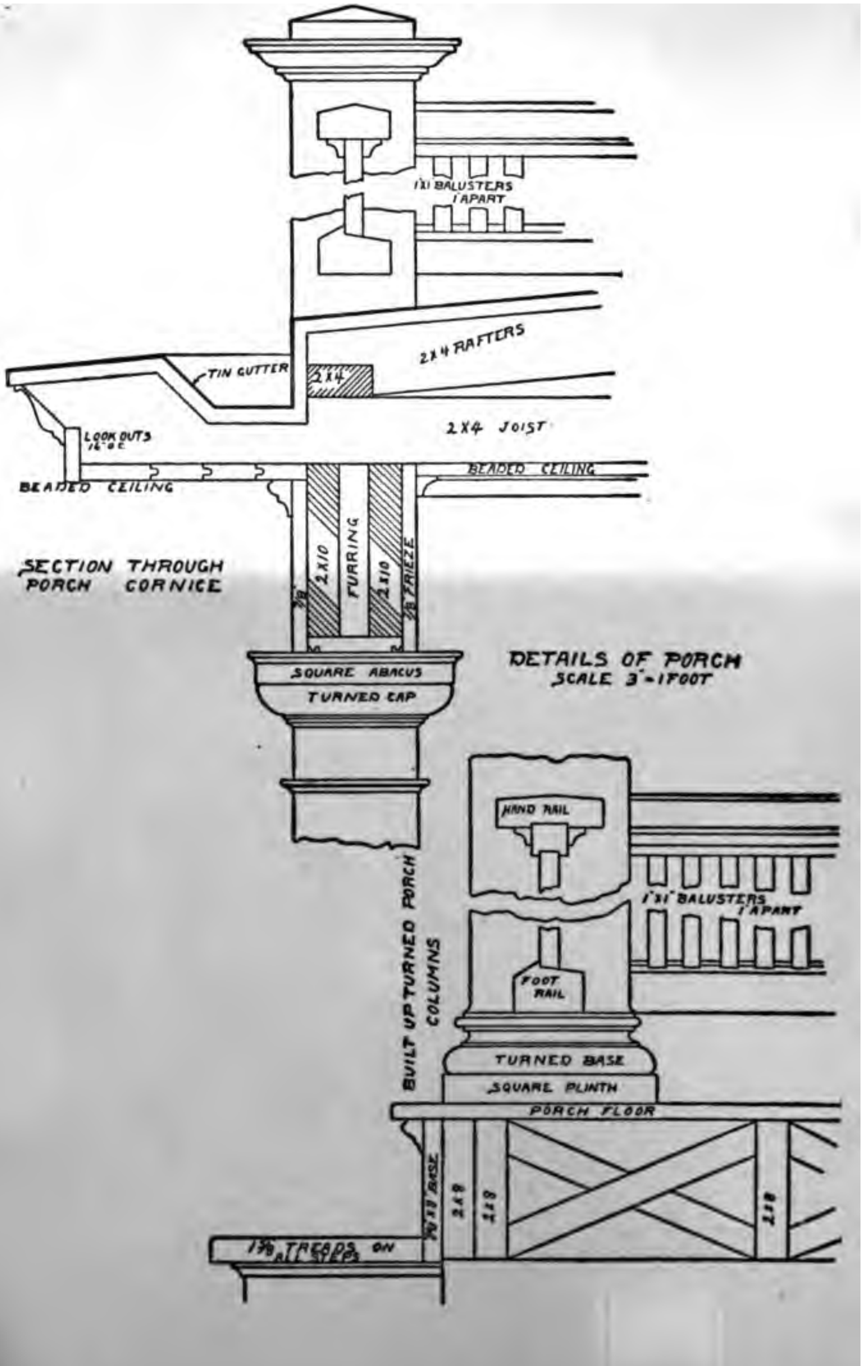


MAIN CORNICE.


TIN ROOF
SHEATHING
BOX GUTTER
2X4
2X4
2X4
2X10
2X10
24"
SIDING
DETAIL OF PORCH
18"
HAND RAIL
PORCH FLOOR
1½ TREADS ON ALL STEPS

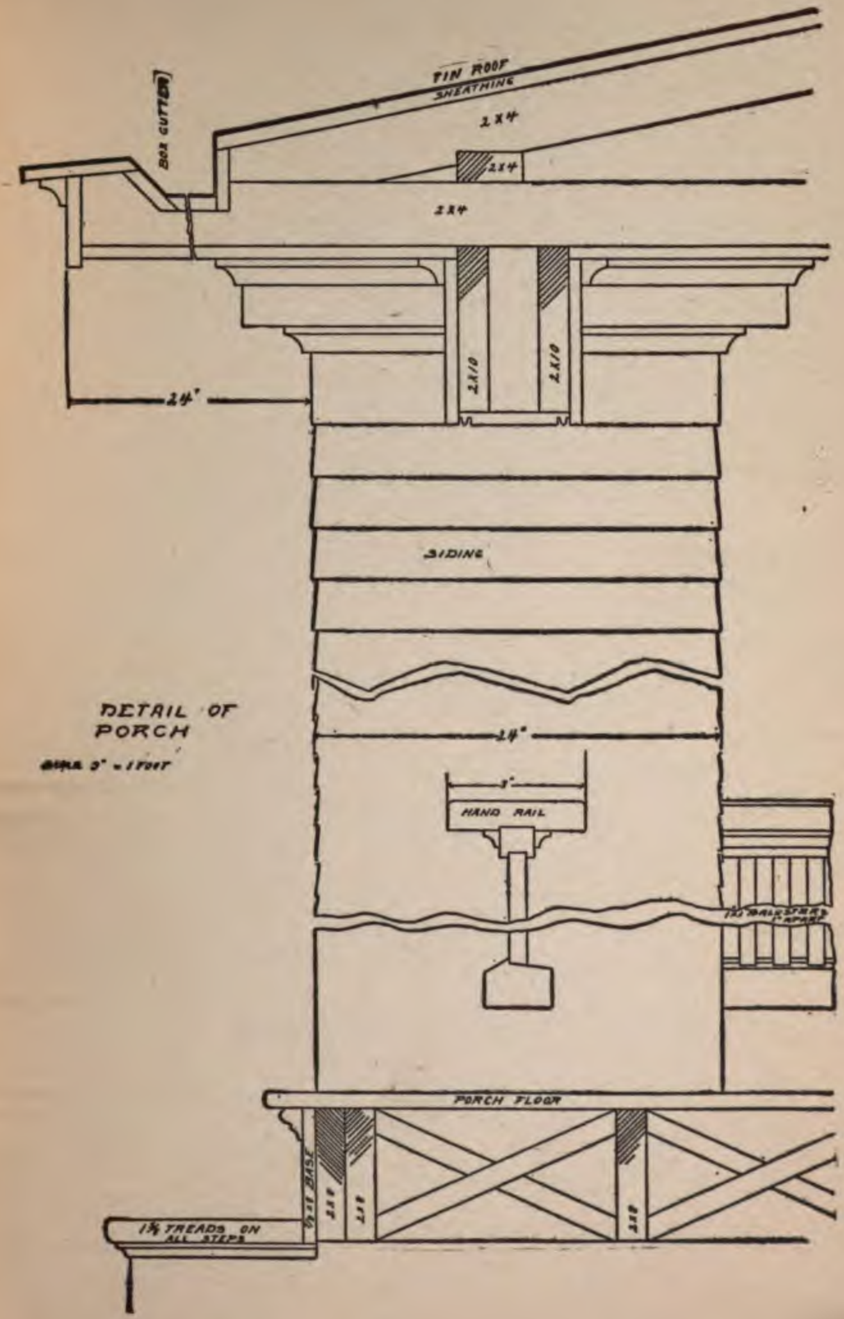


DETAIL OF MAIN CORNICE



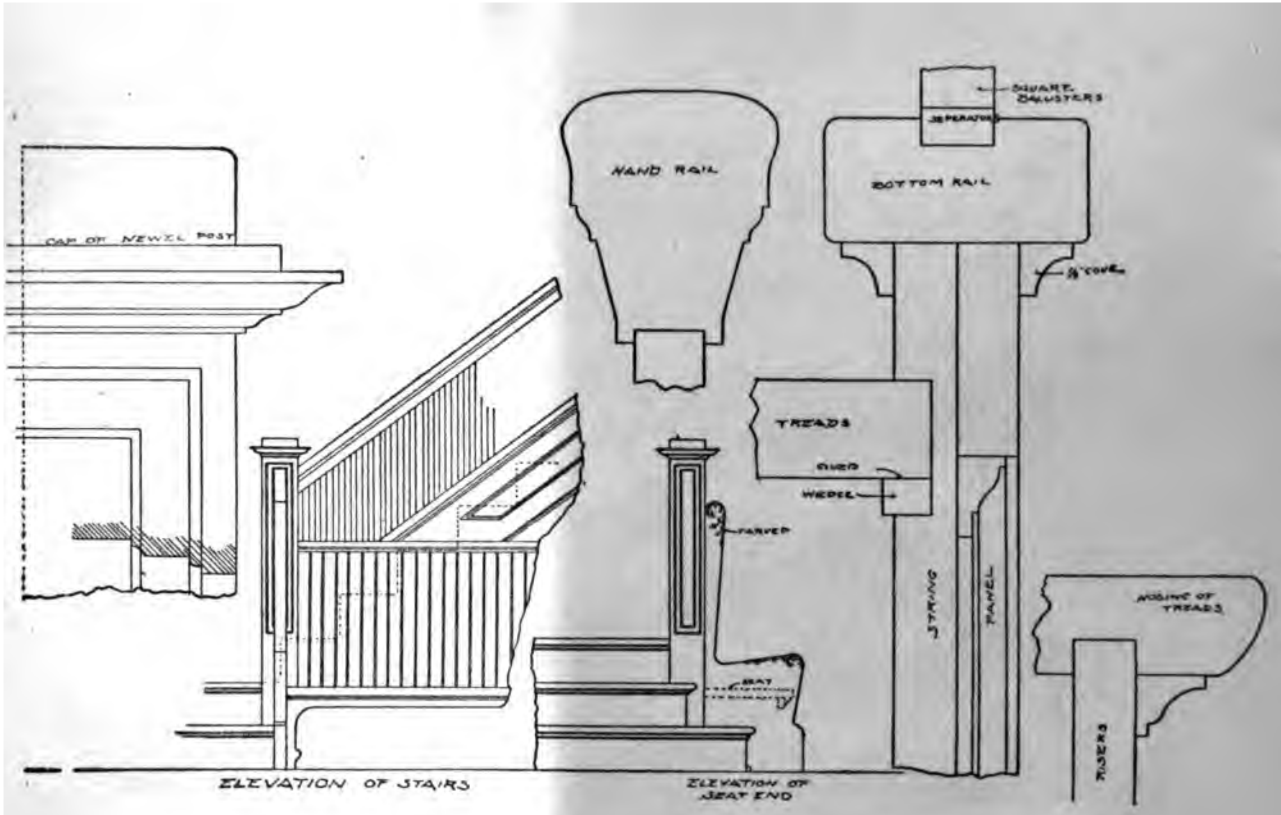
SECTION THROUGH PORCH CORNICE

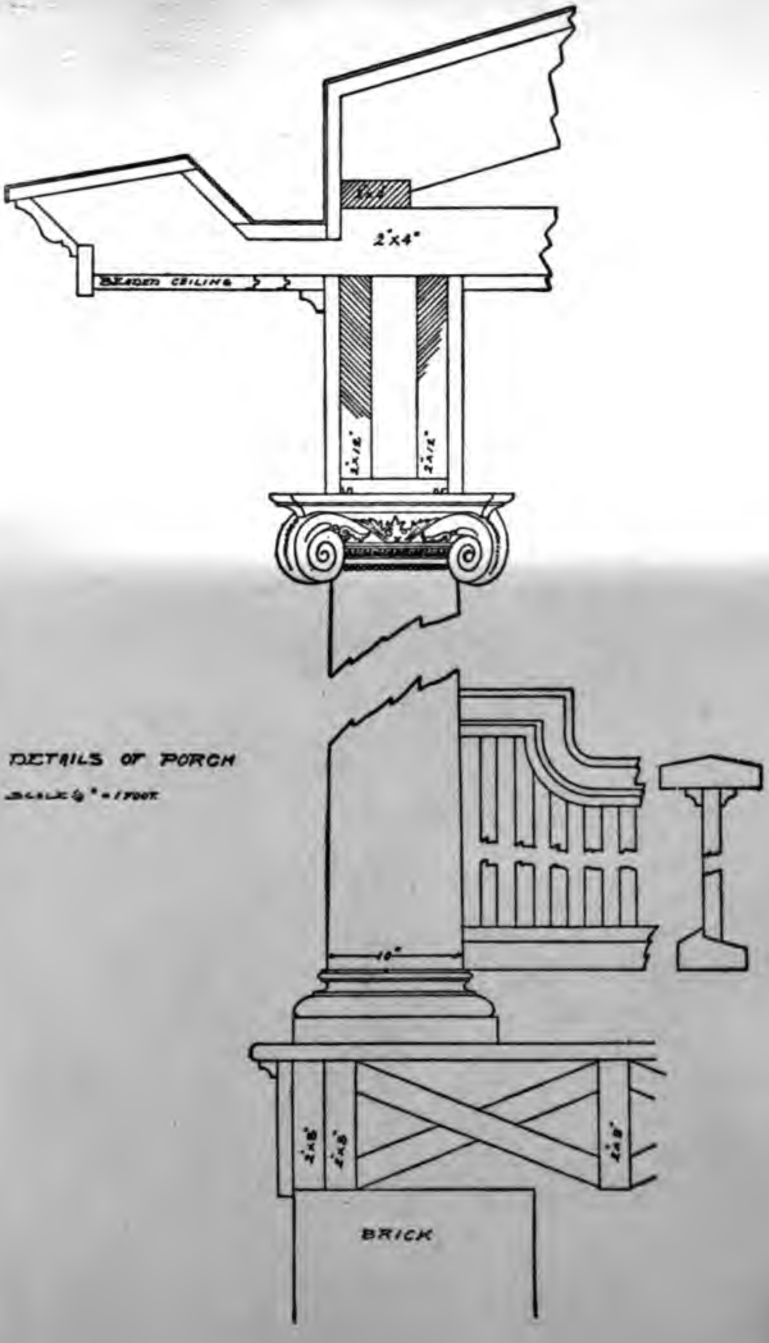
DETAILS OF PORCH
SCALE 3"=1FOOT



DETAIL OF PORCH

SCALE 3" = 1 FOOT


CAP OF NEWEL POST
HAND RAIL
SQUARE BALUSTERS
SEPERATOR
BOTTOM RAIL
3/4" COVE
TREADS
GLUED
WEDGE
CARVED
STRING
PANEL
NOSING OF TREADS
RISERS
SEAT
ELEVATION OF STAIRS
ELEVATION OF SEAT END



DETAILS OF PORCH
SCALE ¾" = 1 FOOT.

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# Practical House Plans

**WE ILLUSTRATE IN THIS BOOK** the perspective view and floor plans of 50 low and medium-priced houses. In the preparation of this work great care has been exercised in the selection of original, practical and attractive house designs, such as seventy-five to ninety per cent of the people to-day wish to build. In drawing these plans special effort has been made to provide for the MOST ECONOMICAL CONSTRUCTION, thereby giving the home builder and contractor the benefit of the saving of many dollars; for in no case have we put any useless expense upon the building simply to carry out some pet idea. Every plan illustrated will show, by the complete working plans and specifications, that we give you designs that will work out to the best advantage and will give you the most for your money; besides every bit of space has been utilized to the best advantage.

**$50.00 PLANS FOR ONLY $5.00** This department has for its foundation the best equipped architectural establishment ever maintained for the purpose of furnishing the public with complete working plans and specifications at the remarkably low price of only $5.00 per set. Every plan we illustrate has been designed by a licensed architect, who stands at the head of his profession in this particular class of work and has made a specialty of low and medium-priced houses. The price usually charged for this work is from $50.00 to $75.00.

**WHAT WE GIVE YOU** The first question you will ask is, "What do we get in these complete working plans and specifications? Of what do they consist? Are they the cheap printed plans on tissue paper without details or specifications?" We do not blame you for wishing to know what you will get for your money.

### BLUE PRINTED WORKING PLANS

The plans we send out are the regular blue printed plans, drawn one-quarter inch scale to the foot, showing all the elevations, floor plans and necessary interior details. All of our plans are printed by electricity on an electric circular blue-printing machine, and we use the very best grade of electric blue-printing paper; every line and figure showing perfect and distinct.

### FOUNDATION AND CELLAR PLANS

This sheet shows the shape and size of all walls, piers, footings, posts, etc., and of what materials they are constructed; shows the location of all windows, doors, chimneys, ash-pits, partitions, and the like. The different wall sections are given, showing their construction and measurements from all the different points.

### FLOOR PLANS

These plans show the shape and size of all rooms, halls and closets; the location and size of all doors and windows; the position of all plumbing fixtures, gas lights, registers, pantry work, etc., and all the measurements that are necessary are given.

### ELEVATIONS

A front, right, left and rear elevation are furnished with all the plans. These drawings are complete and accurate in every respect. They show the shape, size and location of all doors, windows, porches, cornices, towers, bays, and the like; in fact, give you an exact scale picture of the house as it should be at completion. Full wall sections are given showing the construction from foundation to roof, the height of stories between the joists, height of plates, pitch of roof, etc.

**ROOF PLAN** This plan is furnished where the roof construction is at all intricate. It shows the location of all hips, valleys, ridges, decks, etc. All the above drawings are made to scale one-quarter inch to the foot.

**DETAILS** All necessary details of the interior work, such as door and window casings and trim, base, stools, picture moulding, doors, newel posts, balusters, rails, etc., accompany each set of plans. Part is shown in full size, while some of the larger work, such as stair construction, is drawn to a scale of one and one-half inch to the foot. These blue prints are substantially and artistically bound in cloth and heavy water-proof paper, making a handsome and durable covering and protection for the plans.

**SPECIFICATIONS** The specifications are typewritten on Lakeside Bond Linen paper and are bound in the same artistic manner as the plans, the same cloth and water-proof paper being used. They consist of from about sixteen to twenty pages of closely typewritten matter, giving full instructions for carrying out the work. All directions necessary are given in the clearest and most explicit manner, so that there can be no possibility of a misunderstanding.

**BASIS OF CONTRACT** The working plans and specifications we furnish can be made the basis of contract between the home builder and the contractor. This will prevent mistakes, which cost money, and they will prevent disputes which are unforeseen and never settled satisfactorily to both parties. When no plans are used the contractor is often obliged to do some work he did not figure on, and the home builder often does not get as much for his money as he expected, simply because there was no basis on which to work and upon which to base the contract.

**NO MISUNDERSTANDING CAN ARISE** when a set of our plans and specifications is before the contractor and the home builder, showing the interior and exterior construction of the house as agreed upon in the contract. Many advantages may be claimed for the complete plans and specifications. They are time savers and, therefore, money savers. Workmen will not have to wait for instructions when a set of plans is left on the job. They will prevent mistakes in cutting lumber, in placing door and window frames, and in many other places where the contractor is not on the work and the men have received only partial or indefinite instructions. They also give instructions for the working of all material to the best advantage.

**FREE PLANS FOR FIRE INSURANCE ADJUSTMENT** You take every precaution to have your house covered by insurance; but do you make any provision for the adjustment of the loss, should you have a fire? There is not one man in ten thousand who will provide for this embarrassing situation. You can call to mind instances in your own locality where settlements have been delayed because the insurance companies wanted some proof which could not be furnished. They demand proof of loss before paying insurance money, and they are entitled to it. We have provided for this and have inaugurated the following plan, which cannot but meet with favor by whoever builds a house from our plans.

**IMMEDIATELY UPON RECEIPT OF INFORMATION** from you that your house has been destroyed by fire, either totally or partially, we will forward you, free of cost, a duplicate set of plans and specifications, and in addition we will furnish an affidavit giving the number of the design and the date when furnished, to be used for the adjustment of the insurance.

**WITHOUT ONE CENT OF COST TO YOU** and without one particle of trouble. We keep a record of the number of the house design and the date it was furnished, so that, in time of loss, all it will be necessary for you to do is to drop us a line and we will furnish the only reliable method of getting a speedy and satisfactory adjustment. This may be the means of saving you hundreds of dollars, besides much time and worry.

**OUR LIBERAL PRICES** Many have marveled at our ability to furnish such excellent and complete working plans and specifications at such low prices. We do not wonder at this, because we charge but $5.00 for a more complete set of working plans and specifications than you would receive if ordered in the ordinary manner, and when drawn especially for you, at a cost of from fifty to seventy-five dollars. On account of our large business and unusual equipment, and owing to the fact that WE DIVIDE THE COST of these plans among so many, it is possible for us to sell them at these low prices. The margin of profit is very close, but it enables us to sell thousands of sets of plans, which save many times their cost to both the owner and the contractor in erecting even the smallest dwelling.

**OUR GUARANTEE** Perhaps there are many who feel that they are running some risk in ordering plans at a distance. We wish to assure our customers that there is no risk whatever. If, upon receipt of these plans, you do not find them exactly as represented, if you do not find them complete and accurate in every respect, if you do not find them as well prepared as those furnished by any architect in the country, or any that you have ever seen, we will refund your money upon the return of the plans from you in perfect condition. All of our plans are prepared by architects standing at the head of their profession, and the standard of their work is the very highest. We could not afford to make this guarantee if we were not positive that we were furnishing the best plans put out in this country, even though our price is not more than one-seventh to one-tenth of the price usually charged.

**BILL OF MATERIAL** We do not furnish a bill of material. We state this here particularly, as some people have an idea that a bill of material should accompany each set of plans and specifications. In the first place, our plans are gotten up in a very comprehensive manner, so that any carpenter can easily take off the bill of material without any difficulty. We realize that there are hardly two sections of the country where exactly the same kinds of materials are used, and, moreover, a bill which we might furnish would not be applicable in all sections of the country. We furnish plans and specifications for houses which are built as far north as the Hudson Bay and as far south as the Gulf of Mexico. They are built upon the Atlantic and Pacific Coasts, and you can also find them in Australia and South Africa. Each country and section of a country has its peculiarities as to sizes and qualities; therefore, it would be useless for us to make a list that would not be universal. Our houses, when completed, may look the same whether they are built in Canada or Florida, but the same materials will not be used, for the reason that the customs of the people and the climatic conditions will dictate the kind and amount of materials to be used in their construction.

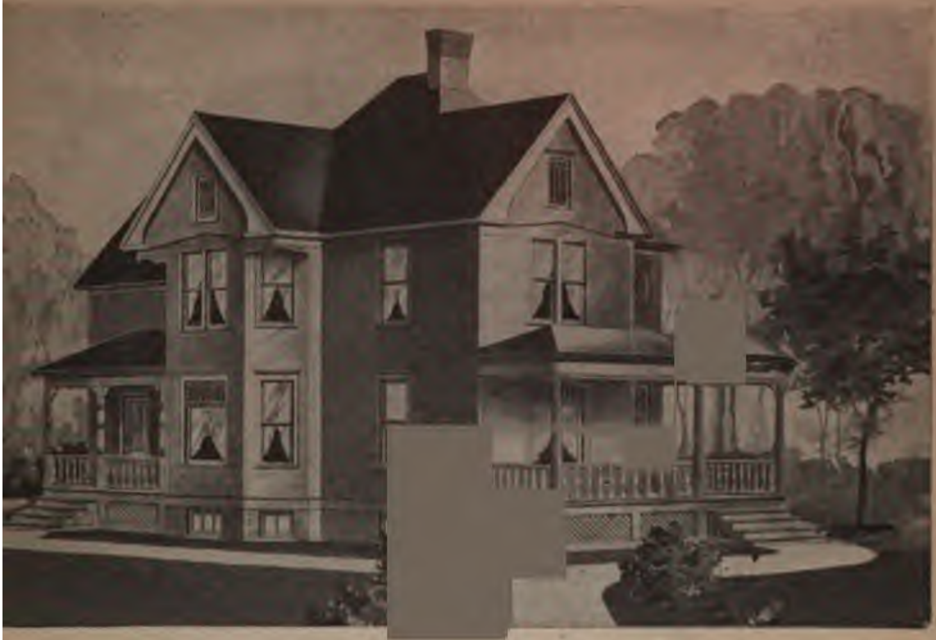
**ESTIMATED COST** It is impossible for anyone to estimate the cost of a building and have the figures hold good in all sections of the country. We do not claim to be able to do it. The estimated cost of the houses we illustrate is based on the most favorable conditions in all respects and includes everything but the plumbing and heating. We are not familiar with your local conditions, and, should we claim to know the exact cost of a building in your locality, a child would know that our statement was false. We leave this matter in the hands of the reliable contractors, for they, and they alone, know your local conditions.

**WE WISH TO BE FRANK WITH YOU** and therefore make no statement that we cannot substantiate in every respect. If a plan in this book pleases you; if the arrangement of the rooms is satisfactory, and if the exterior is pleasing and attractive, then we make this claim—that it can be built as cheaply as if any other architect designed it, and we believe cheaper.

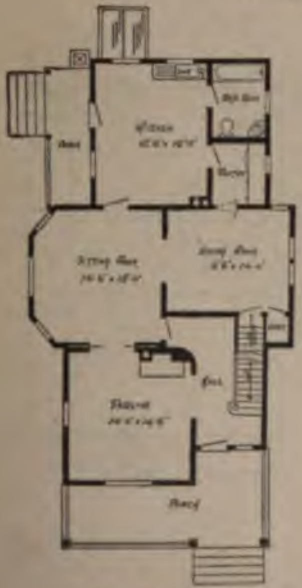
**WE HAVE STUDIED ECONOMY** in construction, and our knowledge of all the material that goes into a house qualifies us to give you the best for your money. We give you a plan that pleases you, one that is attractive, and one where every foot of space is utilized at the least possible cost. Can any architect do more, even at seven to ten times the price we charge you for plans?

**REVERSING PLANS** We receive many requests from our patrons for plans exactly according to the designs illustrated, with the one exception of having them reversed or placed in the opposite direction. It is impossible for us to make this change and draw new plans, except at a cost of about eight times our regular price. We see no reason why our regular plans will not answer your purpose. Your carpenter can face the house exactly as you wish it, and the plans will work out as well facing in one direction as in another. We can, however, if you wish, and so instruct us, make you a reversed blue print and furnish it at our regular price; but in that case all the figures and letters will be reversed and, therefore, liable to cause as much confusion as if your carpenter reversed the plan himself while constructing the house.

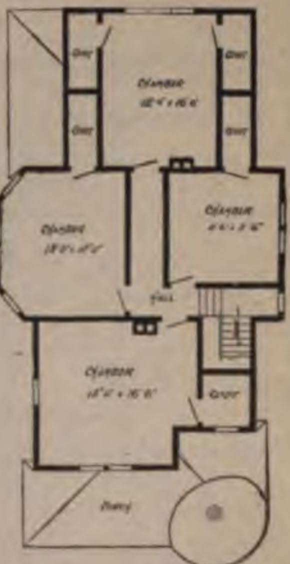
**WE WOULD ADVISE** however, in all cases where the plan is to be reversed, and there is the least doubt about the contractor not being able to work from the plans as we have them, that two sets of blue prints be purchased, one regular and the other reversed, and in such cases we will furnish two sets of blue prints and one set of specifications for only fifty per cent added to the regular cost, making the $5.00 plan cost only $7.50.



## Design No. 1083



**First Floor Plan**



**Second Floor Plan**

### PRICE

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

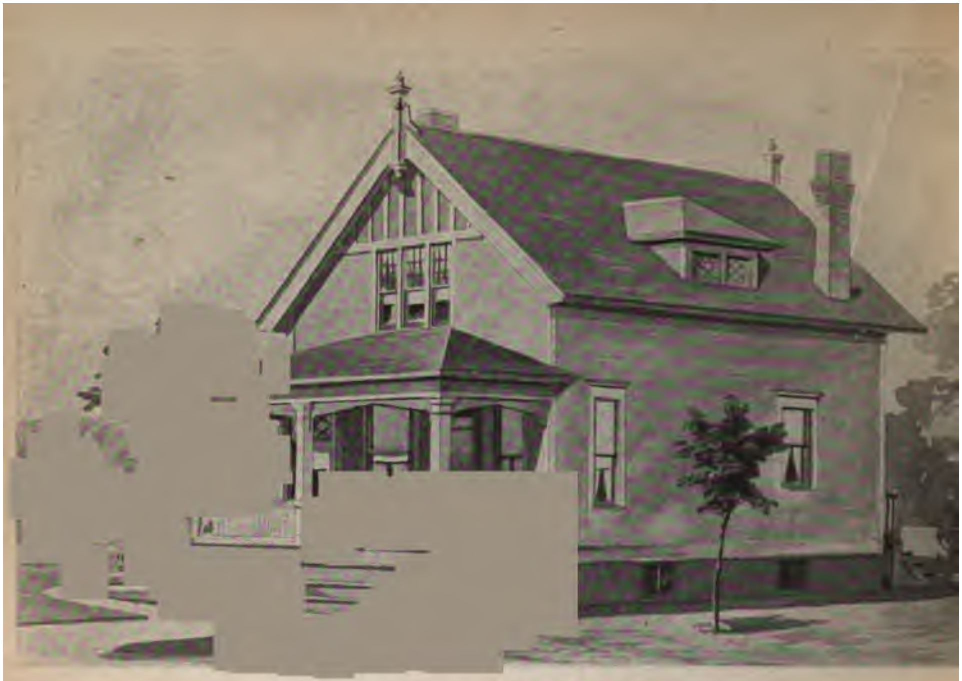
# $5.00

We mail Plans and Specifications the same day order is received.

**Size: Width, 30 feet; length, 48 feet, exclusive of porch**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about fifteen pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $2,750.00 to about $3,000.00, according to the locality in which it is built.



## Design No. 1163

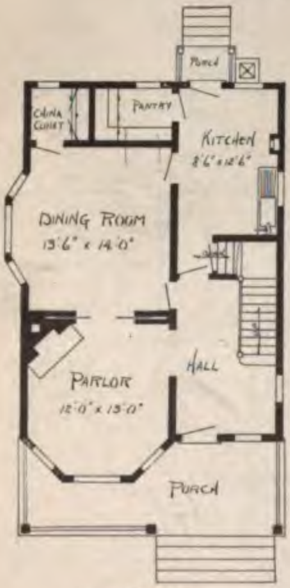
**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

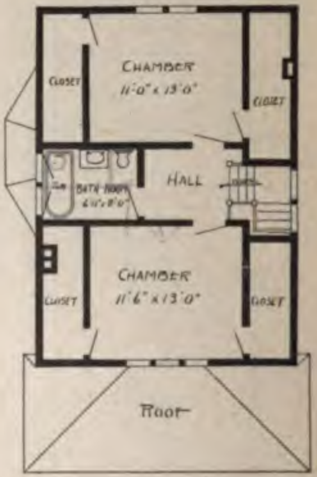
**ONLY**

**$5.00**

We mail Plans and Specifications the same day order is received.



First Floor Plan

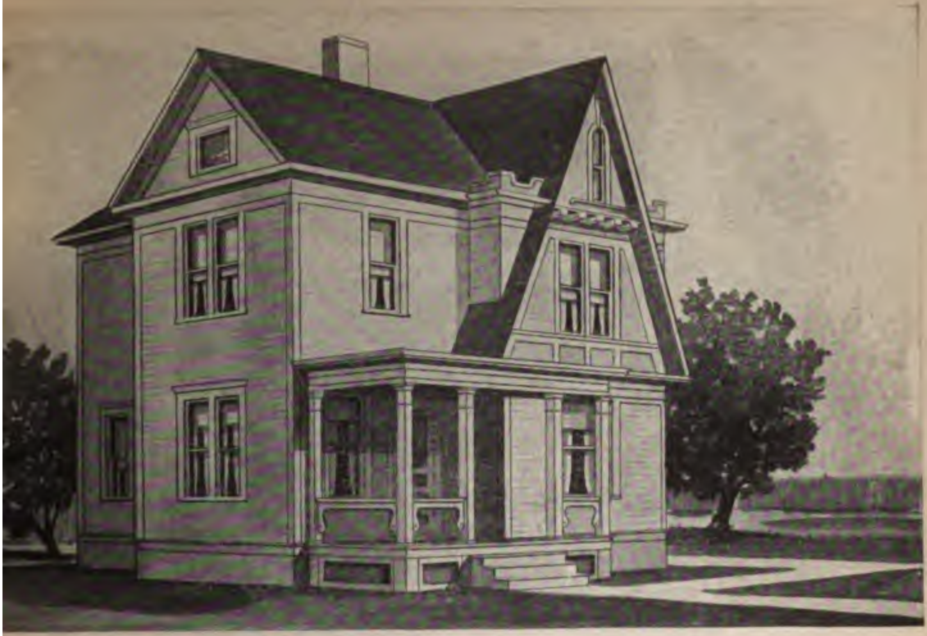


Second Floor Plan

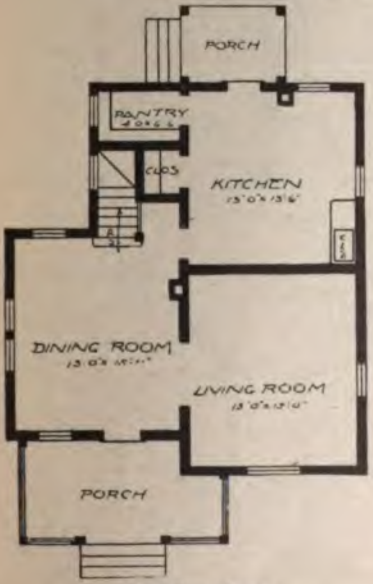
**Size: Width, 22 feet; length, 34 feet, exclusive of porches**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about twenty pages of typewritten matter.

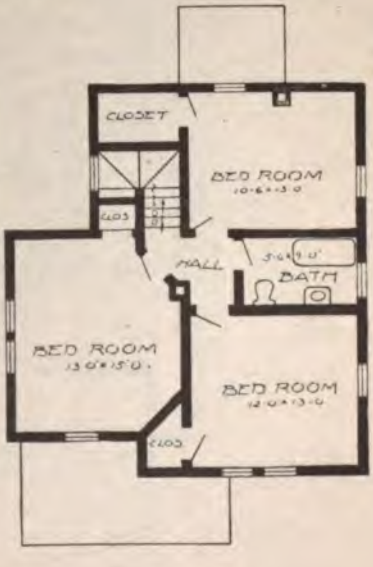
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,050.00 to about $1,200.00, according to the locality in which it is built.



## Design No. 1508



First Floor Plan



Second Floor Plan

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

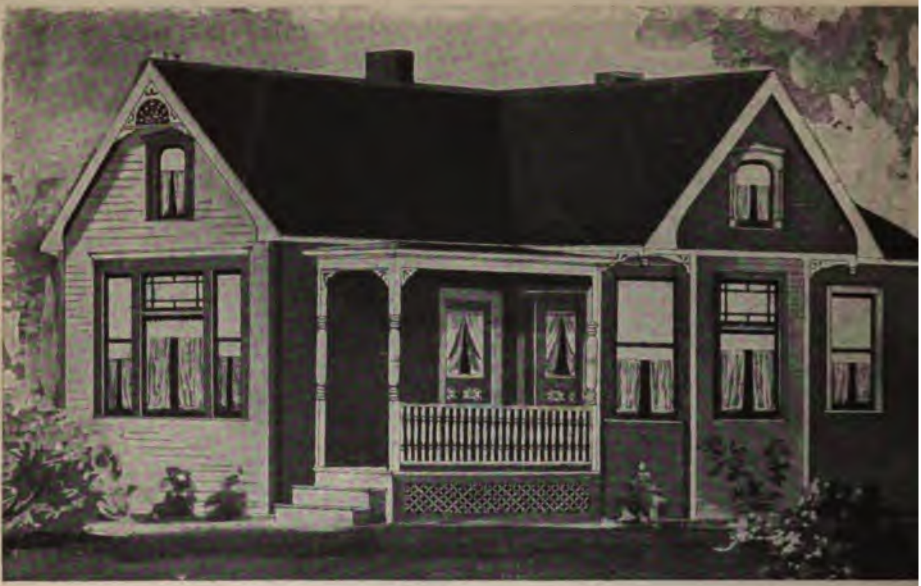
**$5.00**

We mail Plans and Specifications the same day order is received.

**Size: Width, 27 feet 6 inches; length, 30 feet, exclusive of porches**

Blue prints consist of cellar and foundation plan; roof plan; first and second floorplans; front, rear, two side elevations, wall sections and all necessary interior details. Specifications consist of about twenty pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,150.00 to about $1,300.00, according to the locality in which it is built.



## Design No. 1032

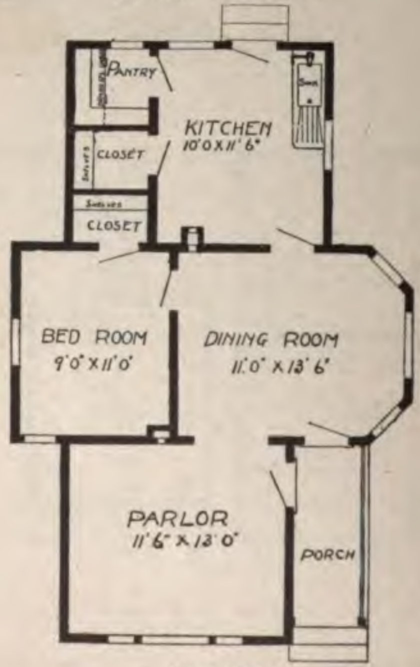
**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

**$5.00**

We mail Plans and Specifications the same day order is received.

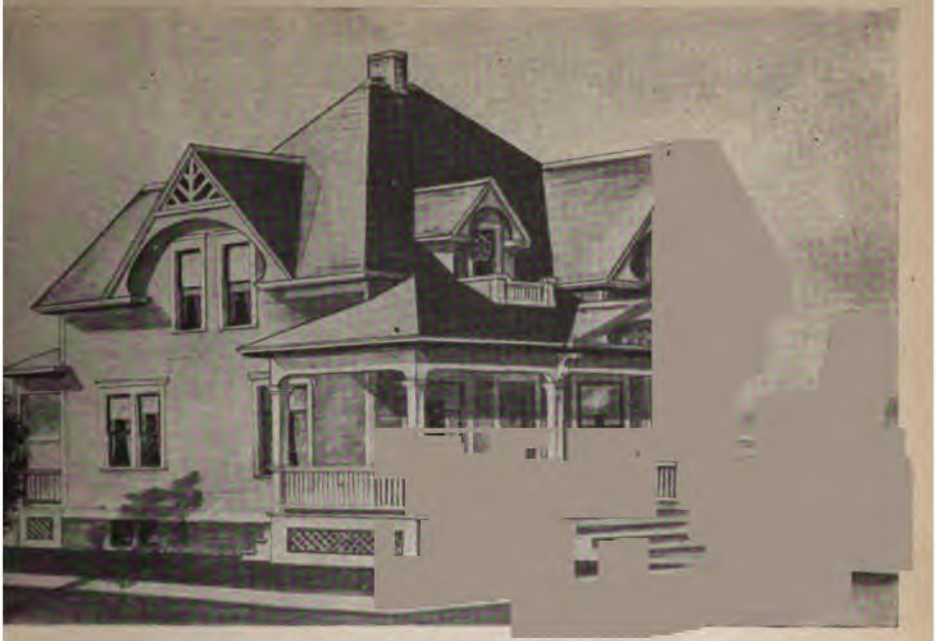


**Floor Plan**

**Size: Width, 24 feet; length, 36 feet**

Blue prints consist of foundation plan; floor plan; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about twelve pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,050.00 to about $1,200.00, according to the locality in which it is built.



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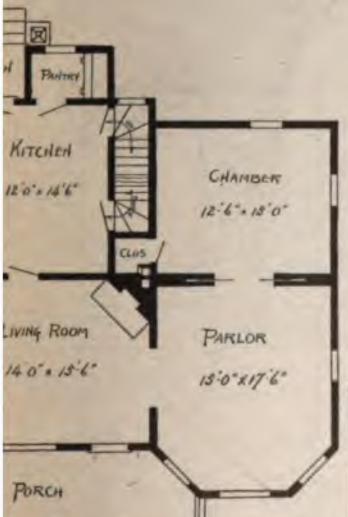
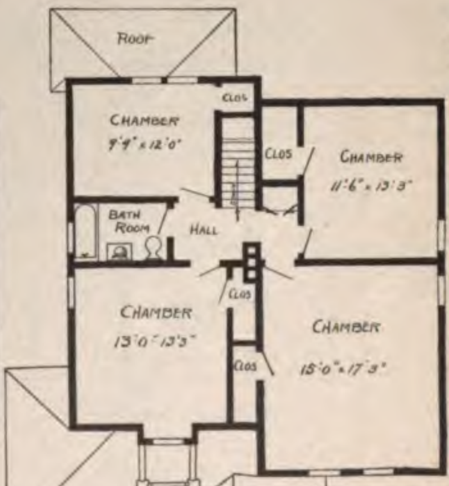


First Floor Plan



Second Floor Plan

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

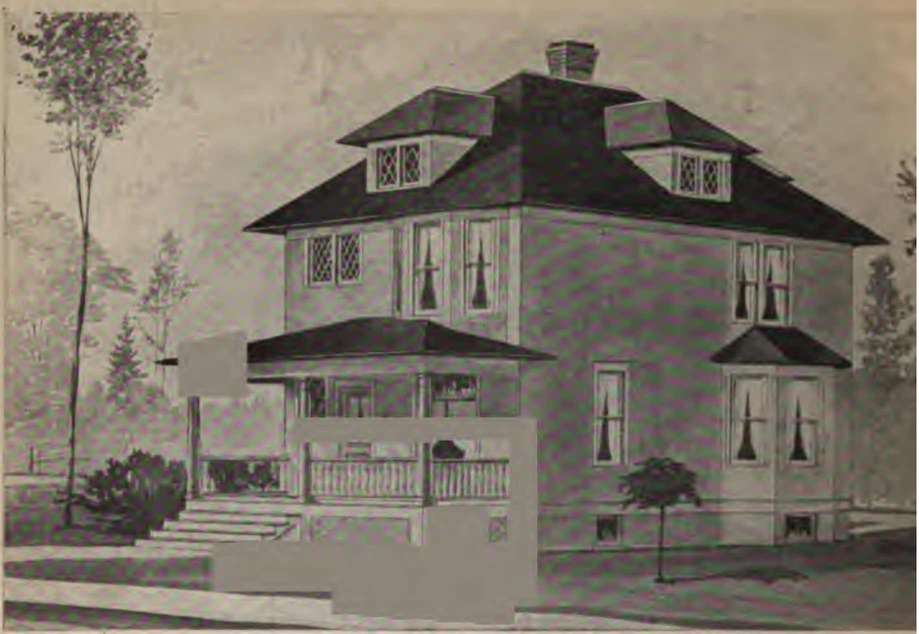
**$5.00**

We mail Plans and Specifications the same day order is received.

**Size: Width, 32 feet; length 34 feet 6 inches, exclusive of porch**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about twenty pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,750.00 to about $1,900.00, according to the locality in which it is built.



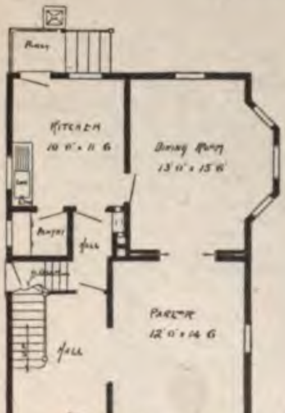
## Design No. 1100

**PRICE**
of Blue Prints, together with a complete set of typewritten specifications is

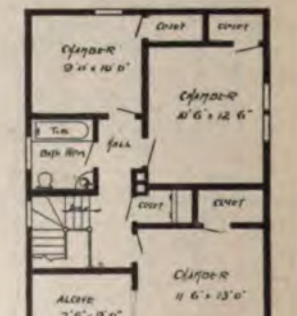
**ONLY**

**$5.00**

We mail Plans and Specifications the same day order is received.



First Floor Plan

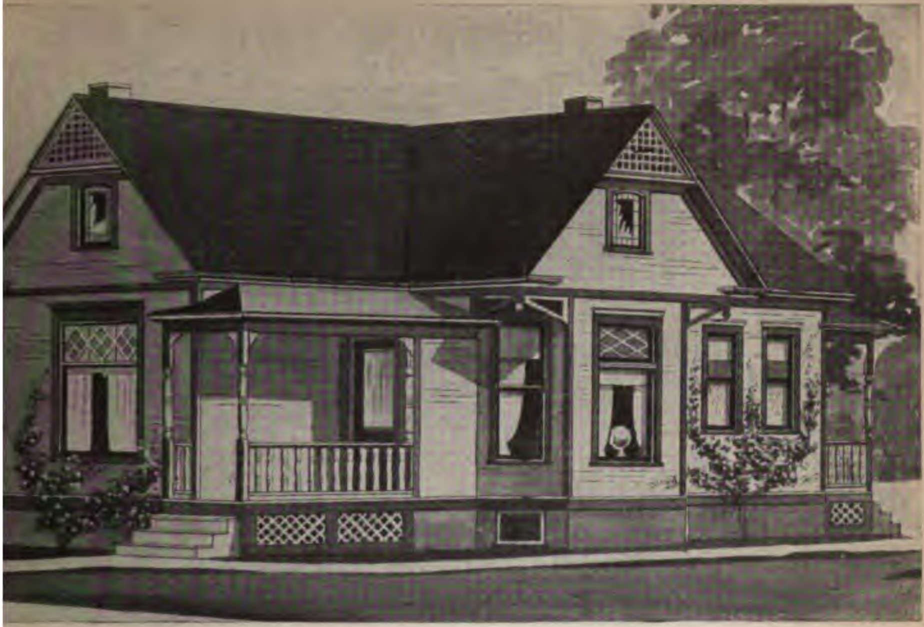


Second Floor Plan

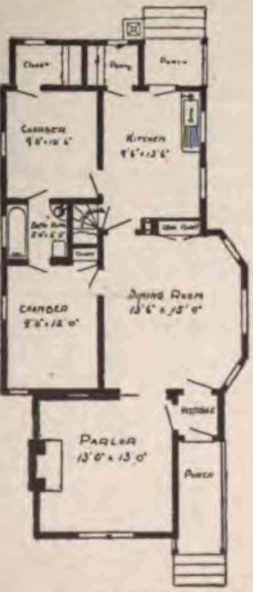
**Size: Width, 24 feet; length, 32 feet, exclusive of porches**

Blue prints consist of cellar and foundation plan; first and second floor plans, front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about twenty pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $2,100.00 to about $2,300.00, according to the locality in which it is built.



## Design No. 1038



Floor Plan

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

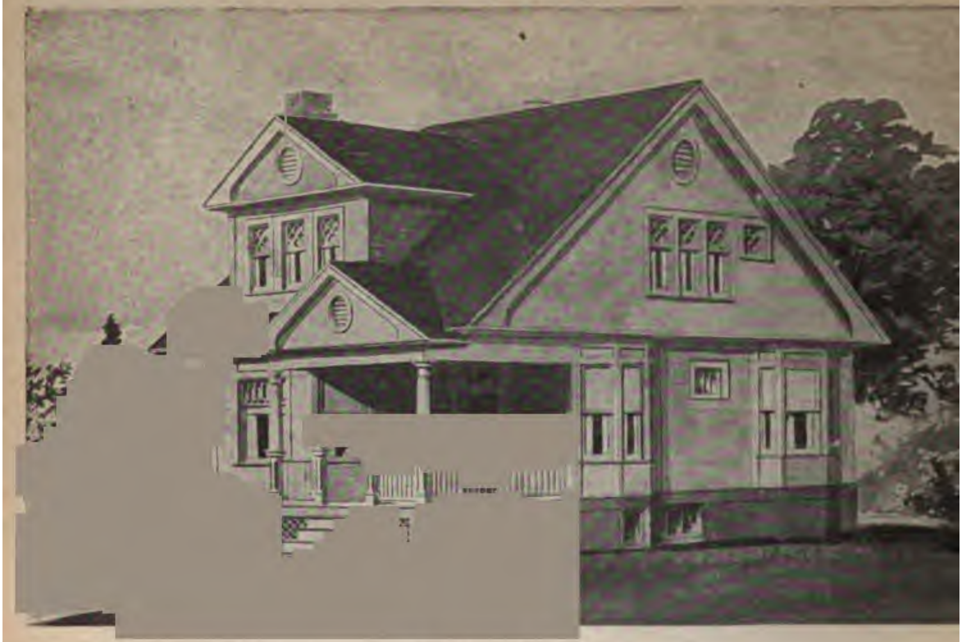
**$5.00**

We mail Plans and Specifications the same day order is received.

**Size: Width, 24 feet; length, 48 feet, exclusive of porches**

Blue prints consist of cellar and foundation plan; floor plan; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about fifteen pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,650.00 to about $1,800.00, according to the locality in which it is built.



## Design No. 1161

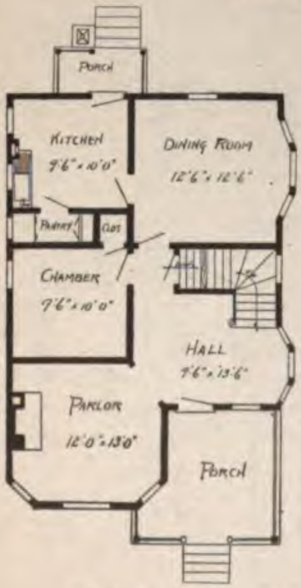
**PRICE**

**of Blue Prints, together with a complete set of typewritten specifications is**

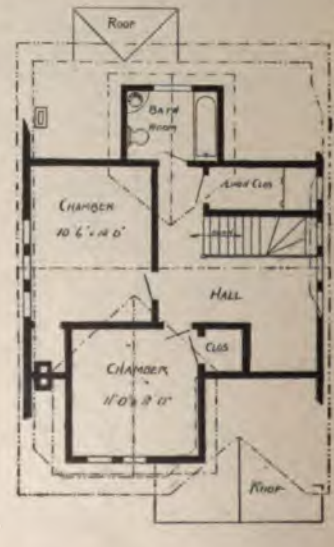
**ONLY**

**$5.00**

**We mail Plans and Specifications the same day order is received.**



**First Floor Plan**

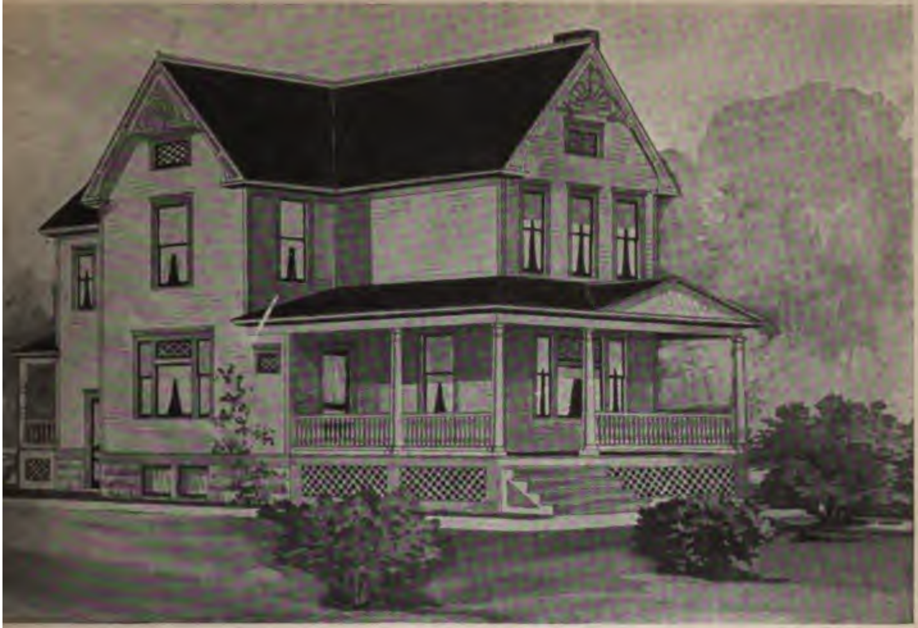


**Second Floor Plan**

**Size: Width, 25 feet; length, 36 feet, exclusive of porches**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about fifteen pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,150.00 to about $1,300.00, according to the locality in which it is built.



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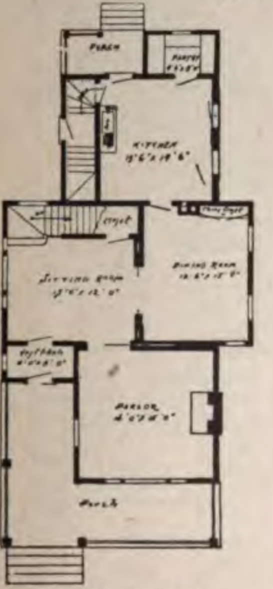
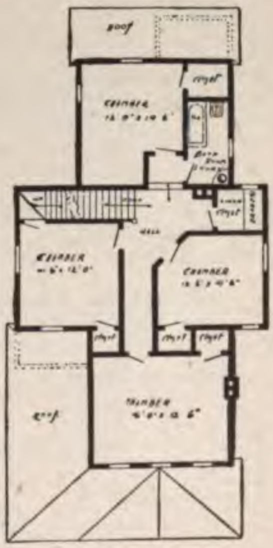


**First Floor Plan**



**Second Floor Plan**

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

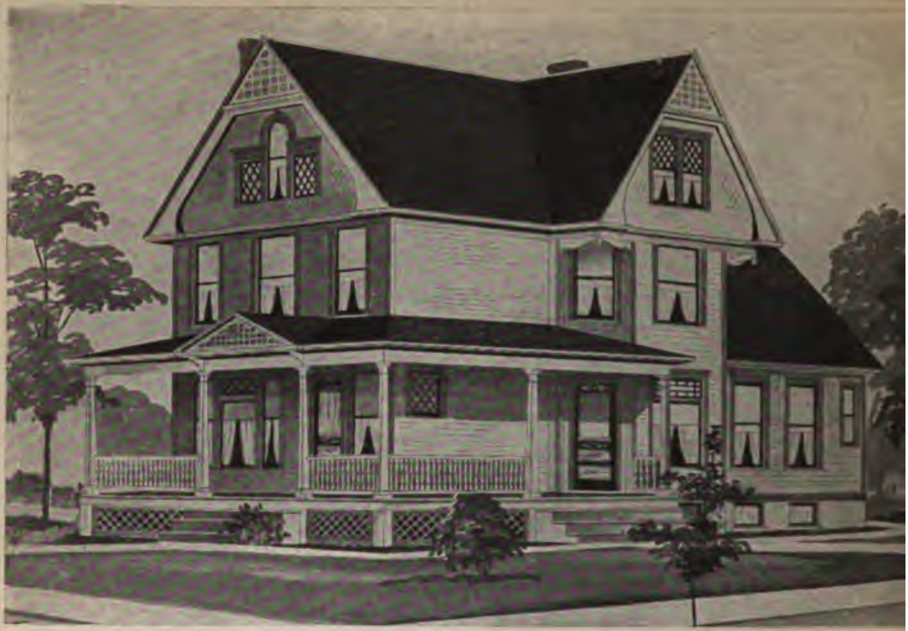
**$5.00**

We mail Plans and Specifications the same day order is received.

**Size: Width, 30 feet; length, 48 feet, exclusive of porch**

Blue prints consist of cellar and foundation plan; roof plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about twenty pages of typewritten *matter.*

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $2,250.00 to about $2,500.00, according to the locality in which it is built.



## Design No. 1019

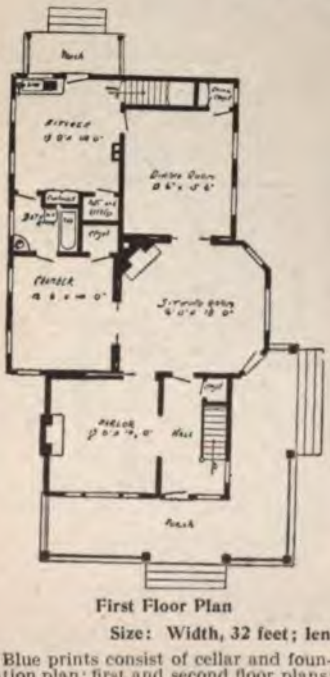
**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

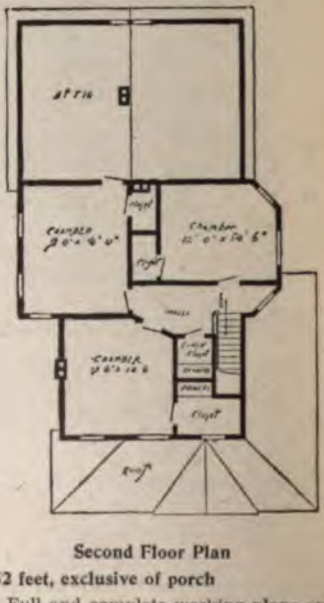
**ONLY**

**$5.00**

We mail Plans and Specifications the same day order is received.



**First Floor Plan**

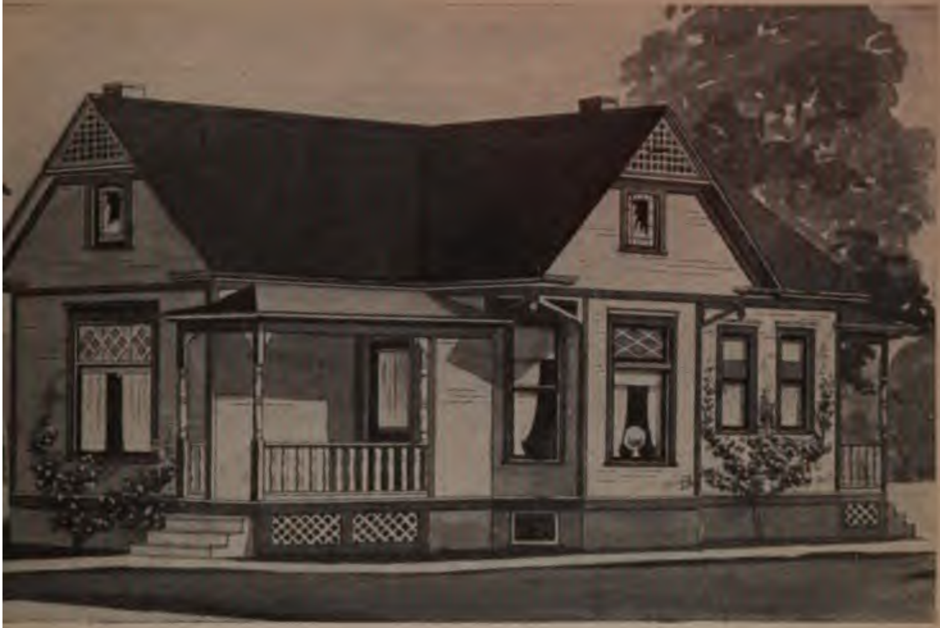


**Second Floor Plan**

**Size: Width, 32 feet; length, 52 feet, exclusive of porch**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about fifteen pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $2,750.00 to about $3,000.00, according to the locality in which it is built.



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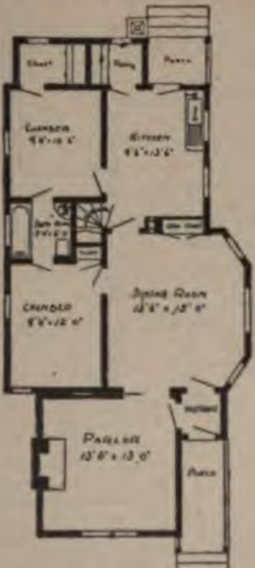


Floor Plan

**Size: Width, 24 feet; length, 48 feet, exclusive of porches**

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

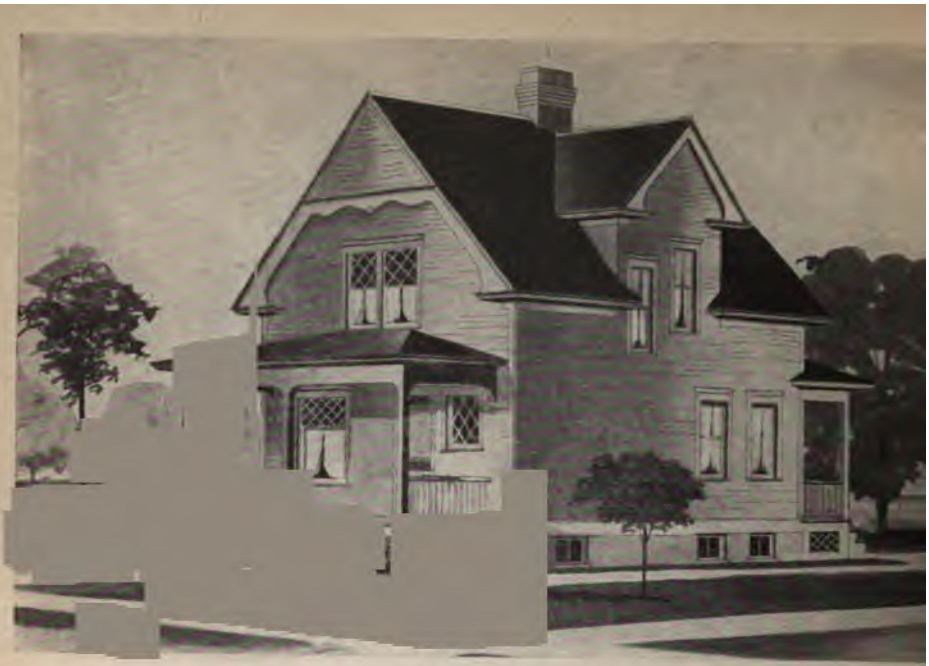
**ONLY**

**$5.00**

We mail Plans and Specifications the same day order is received.

Blue prints consist of cellar and foundation plan; floor plan; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about fifteen pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,650.00 to about $1,800.00, according to the locality in which it is built.



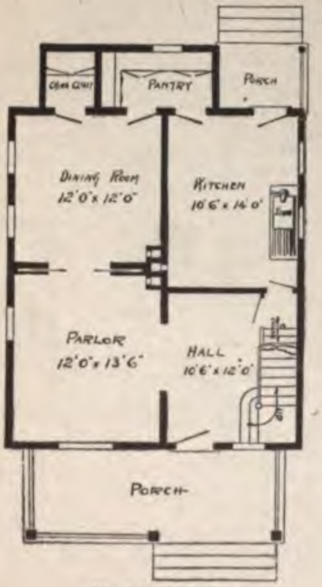
## Design No. 1013

**PRICE**
of Blue Prints, together with a complete set of typewritten specifications is

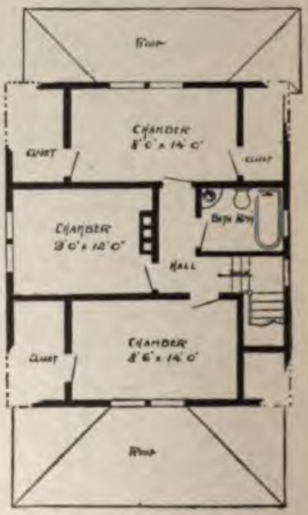
**ONLY**

**$5.00**

We mail Plans and Specifications the same day order is received.



First Floor Plan

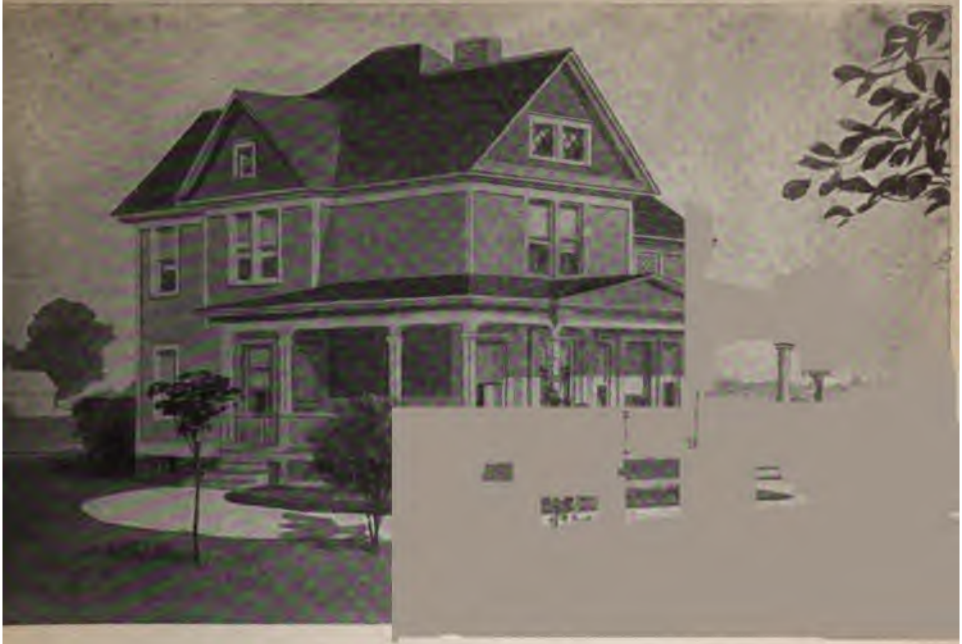


Second Floor Plan

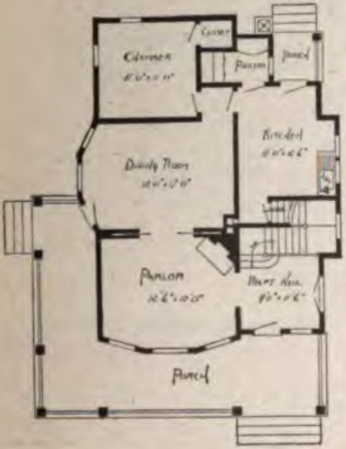
Size: Width, 24 feet; length, 32 feet 6 inches

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about twenty pages of typewritten matter.

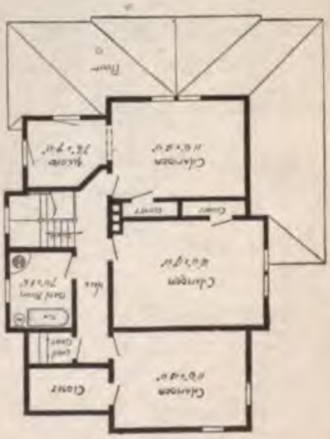
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,750.00 to about $2,000.00, according to the locality in which it is built.



## Design No. 1149



**First Floor Plan**



**Second Floor Plan**

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

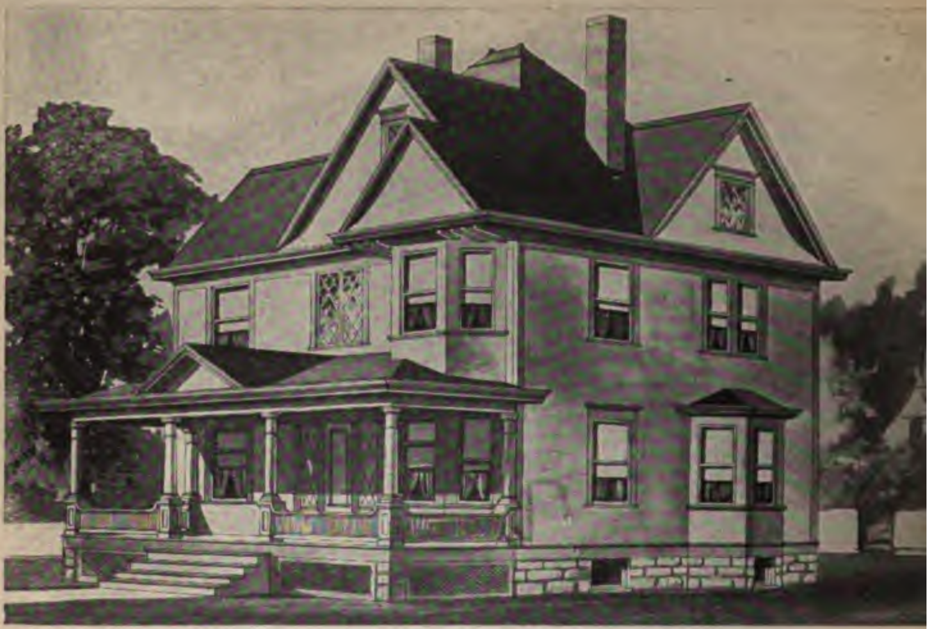
**$5.00**

We mail Plans and Specifications the same day order is received.

**Size: Width, 29 feet 6 inches; length, 38 feet, exclusive of porch**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about fifteen pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $2,500.00 to about $2,750.00, according to the locality in which it is built.



## Design No. 1520

**PRICE**

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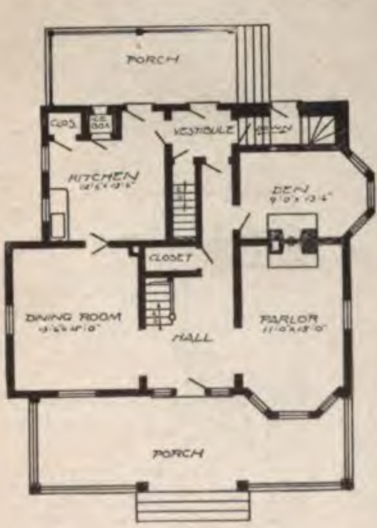
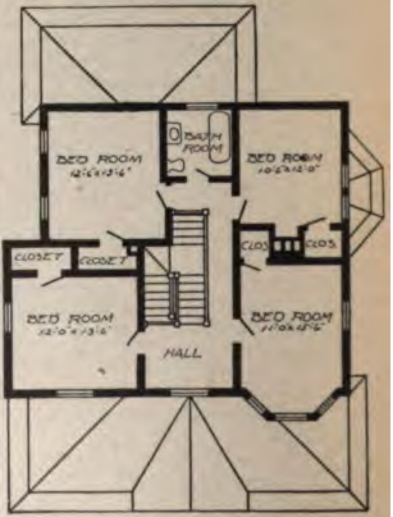


**First Floor Plan**

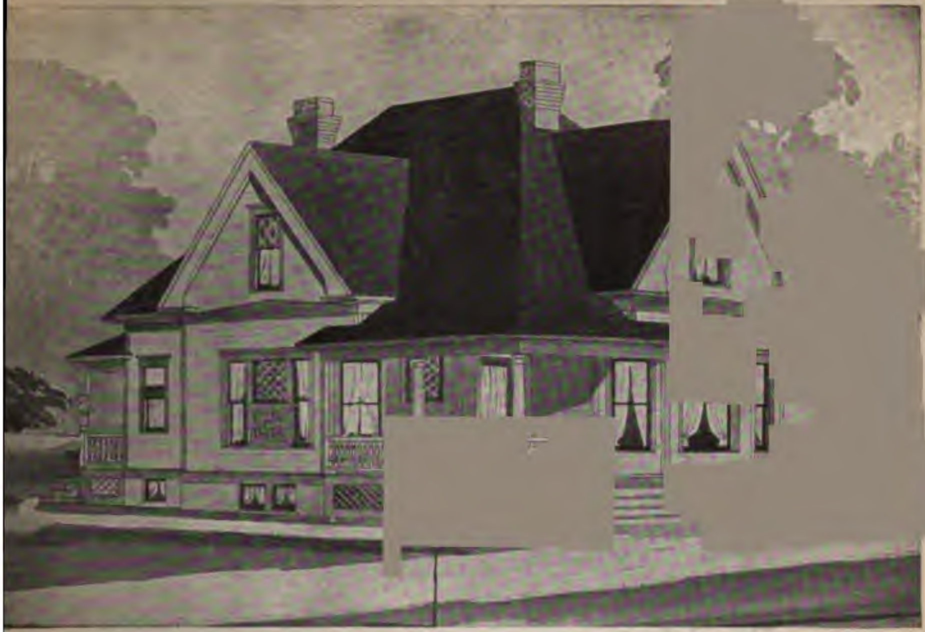


**Second Floor Plan**

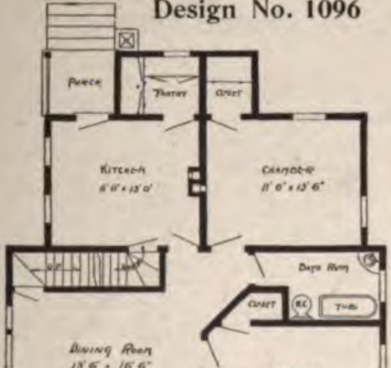
**Size: Width, 36 feet; length, 30 feet, exclusive of porches**

Blue prints consist of cellar and foundation plan; roof plan; first and second floor plans, front, rear, two side elevations; wall sections and all necessary interior *details*. Specifications consist of about *twenty* pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $2,500.00 to about $2,750.00, according to the locality in which it is built.



## Design No. 1096



**PRICE**

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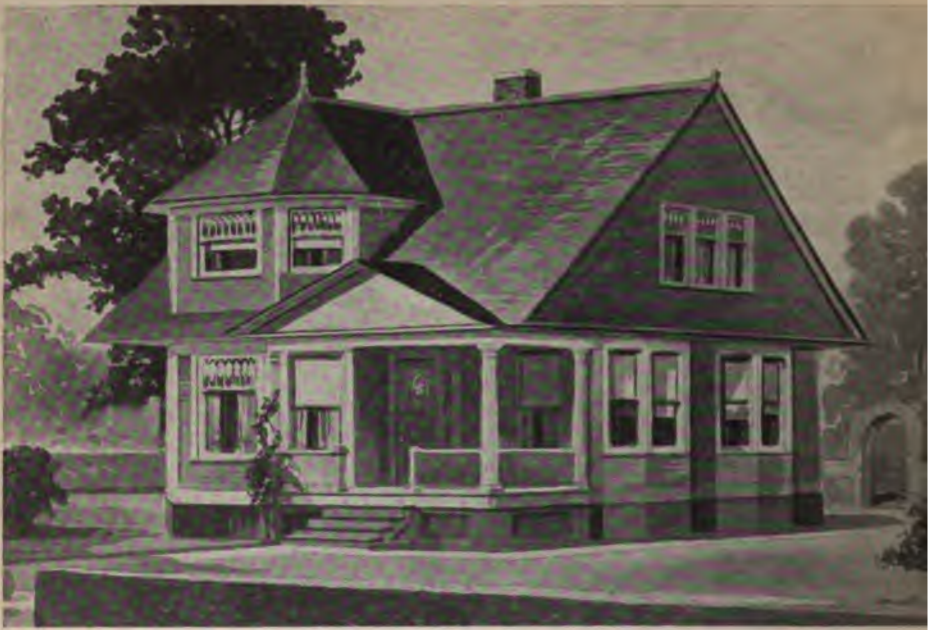
**Floor Plan**

**Size: Width, 33 feet; length, 50 feet**

Blue prints consist of foundation plan; floor plan; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about fifteen pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,850.00 to about $2,000.00, according to the locality in which it is built.



## Design No. 1146

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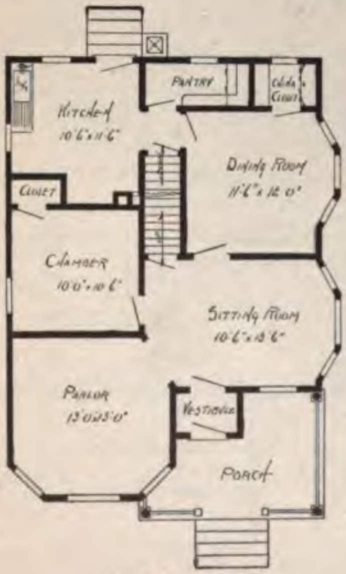
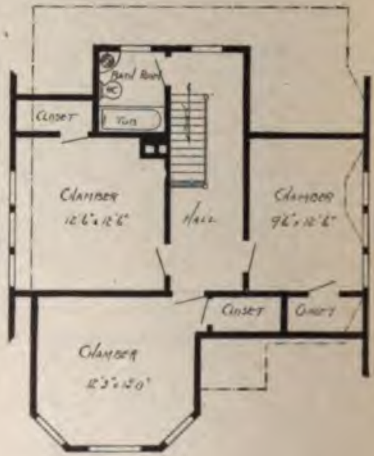


**First Floor Plan**

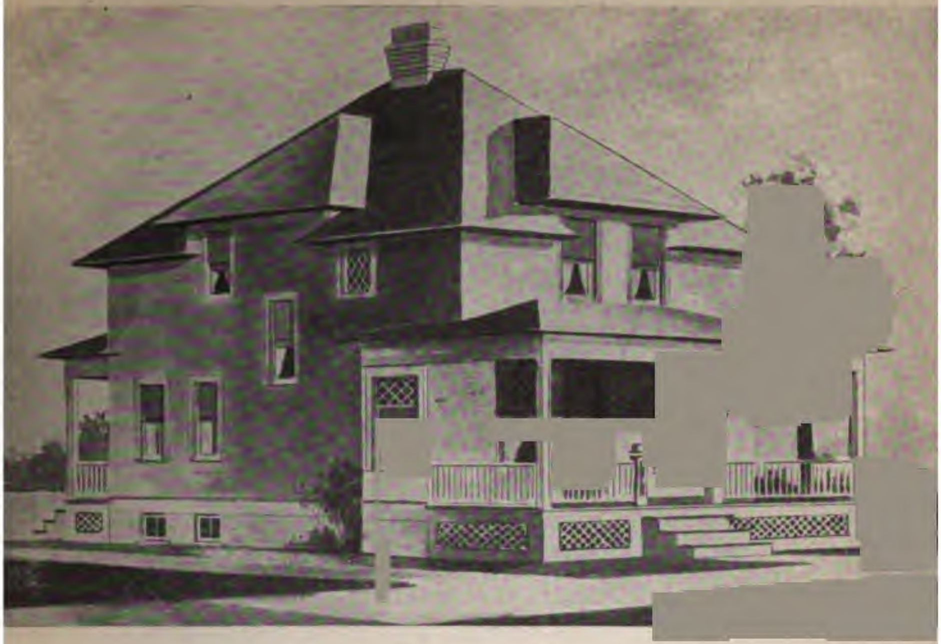


**Second Floor Plan**

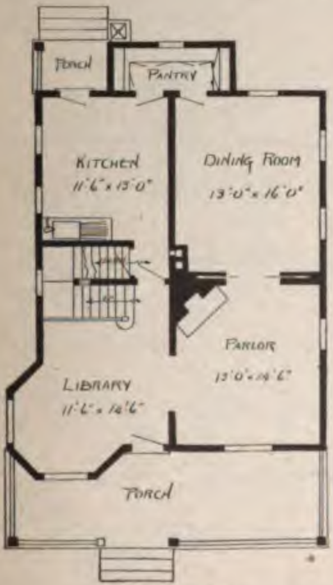
**Size: Width, 27 feet 6 inches; length, 36 feet 6 inches, exclusive of porch**

Blue prints consist of cellar and foundation plan; roof plan; first and second floor plans; front, rear, two side elevations, wall sections and all necessary interior details. Specifications consist of about twenty pages of typewritten matter.

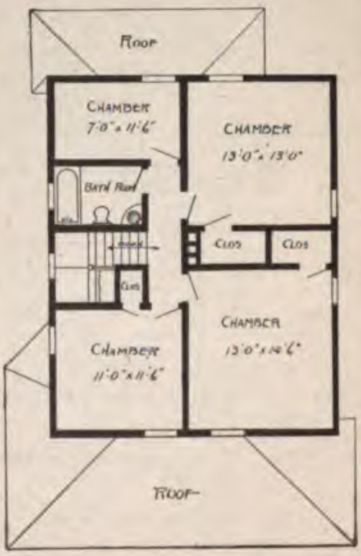
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,150.00 to about $1,300.00, according to the locality in which it is built.



## Design No. 1154



First Floor Plan



Second Floor Plan

**Size: Width, 28 feet 6 inches; length, 37 feet, exclusive of porch**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about twenty pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,950.00 to about $2,100.00, according to the locality in which it is built.

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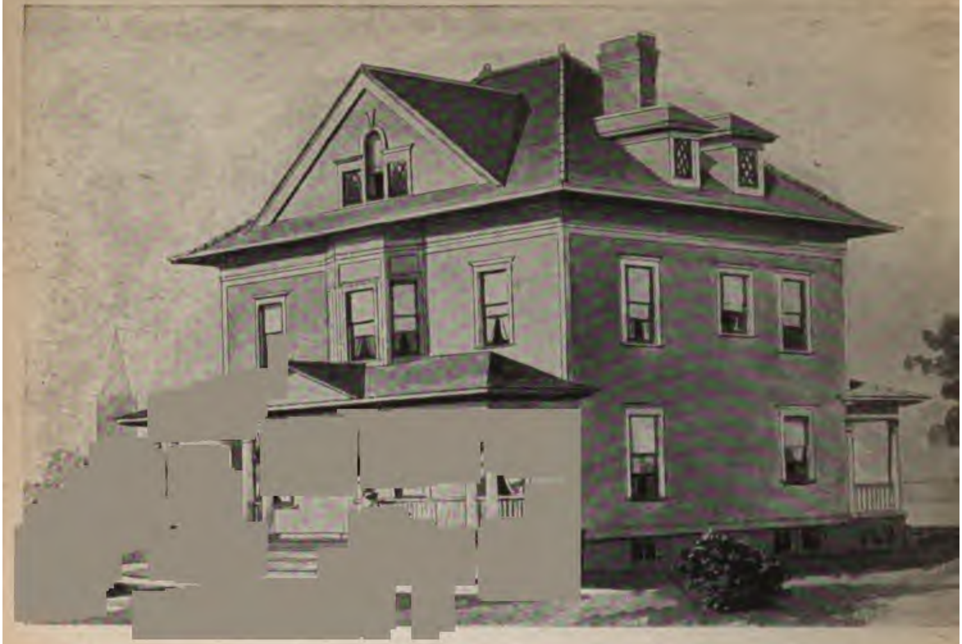

## Design No. 1148

**PRICE**

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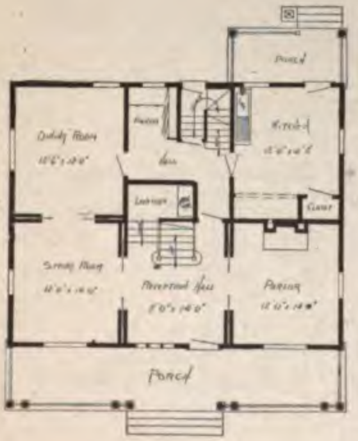
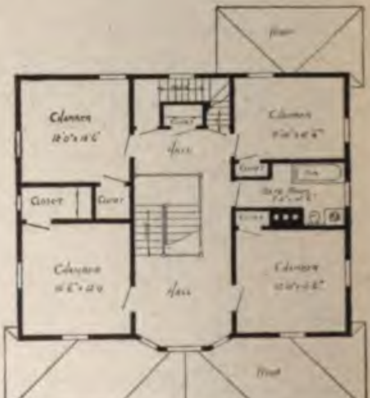


First Floor Plan

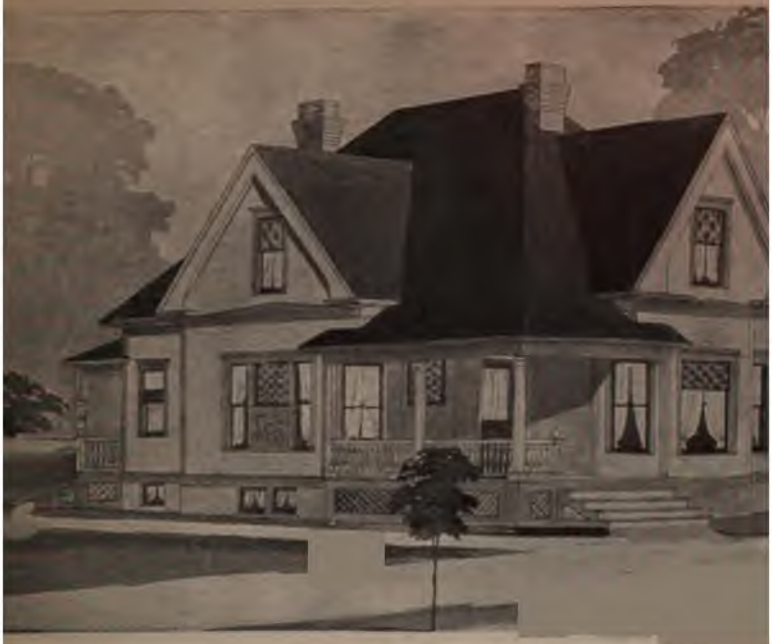


Second Floor Plan

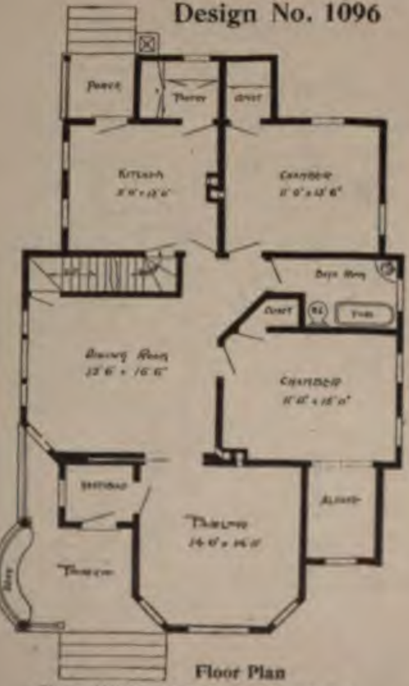
**Size: Width, 38 feet; length, 31 feet, exclusive of porches**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. *Specifications consist of about twenty pages of typewritten matter.*

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $2,500.00 to about $2,750.00, according to the locality in which it is built.



## Design No. 1096

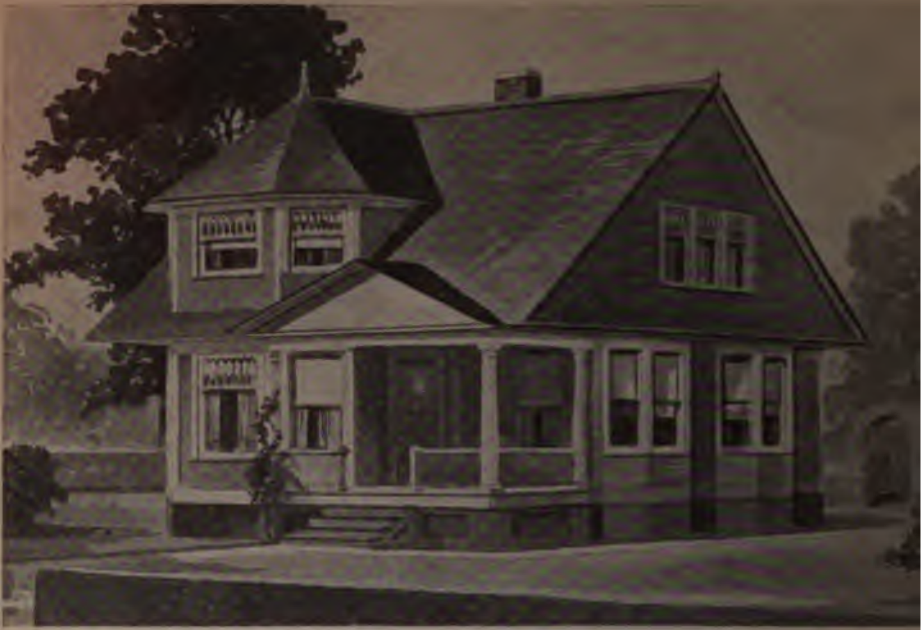


**Floor Plan**

**Size: Width, 33 feet; length, 50 feet**

Blue prints consist of foundation plan; floor plan; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about fifteen pages of typewritten matter.

Full and complete working plans an specifications of this house will be fur nished for $5.00. Cost of this house from about $1,850.00 to about $2,000.00 according to the locality in which it built.



## Design No. 1146

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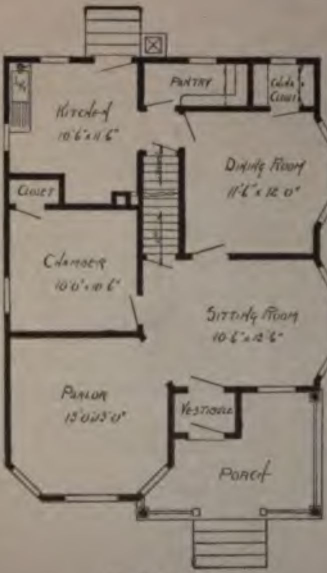
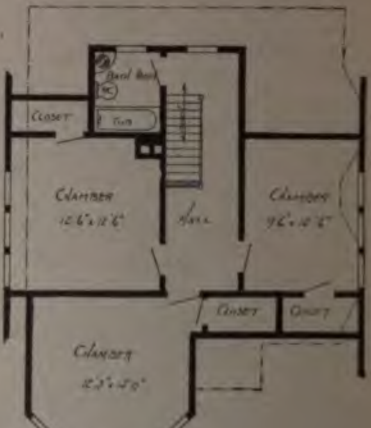


**First Floor Plan**

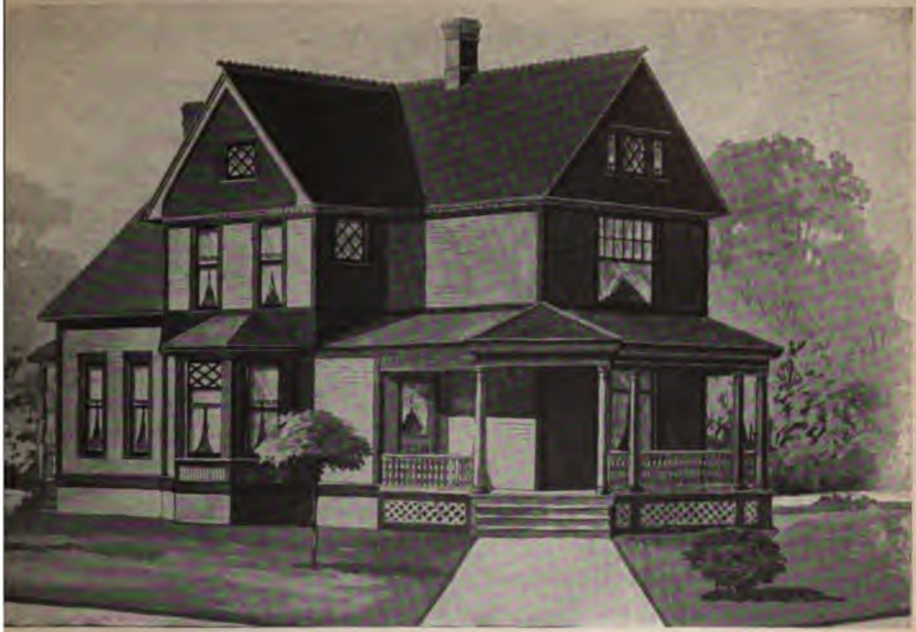


**Second Floor Plan**

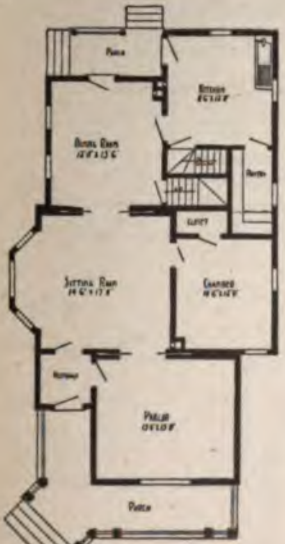
**Size: Width, 27 feet 6 inches; length, 36 feet 6 inches, exclusive of porch**

Blue prints consist of cellar and foundation plan; roof plan; first and second floor plans; front, rear, two side elevations, [illegible] sections and all necessary interior [illegible]. Specifications consist of about [illegible] pages of typewritten matter.

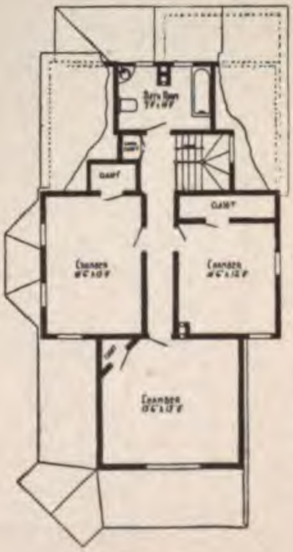
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,150.00 to about $1,300.00, according to the locality in which it is built.



## Design No. 1040



First Floor Plan



Second Floor Plan

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

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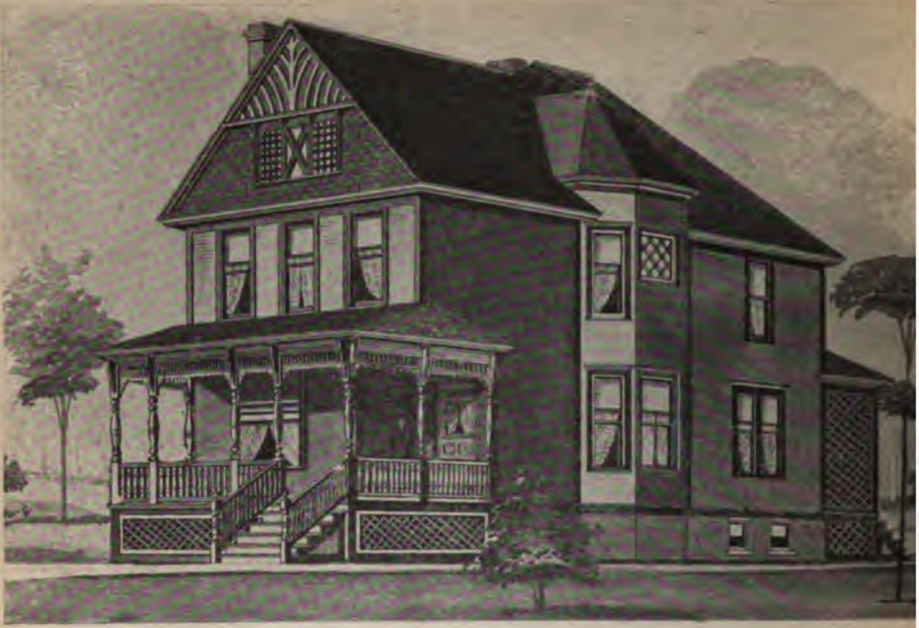
We mail Plans and Specifications the same day order is received

**Size: Width, 29 feet; length, 49 feet, exclusive of porches**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about twenty pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $2,250.00 to about $2,500.00, according to the locality in which it is built.



## Design No. 1011

**PRICE**

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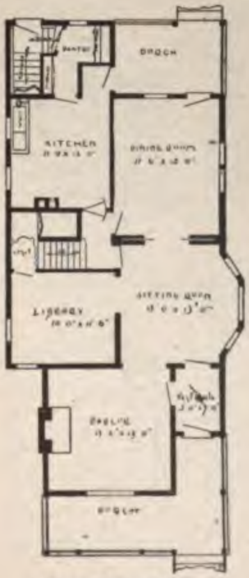
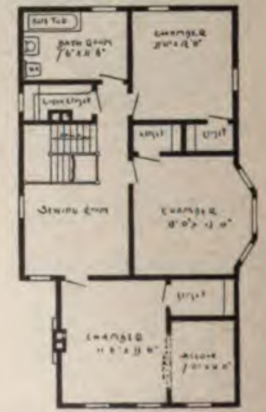


First Floor Plan

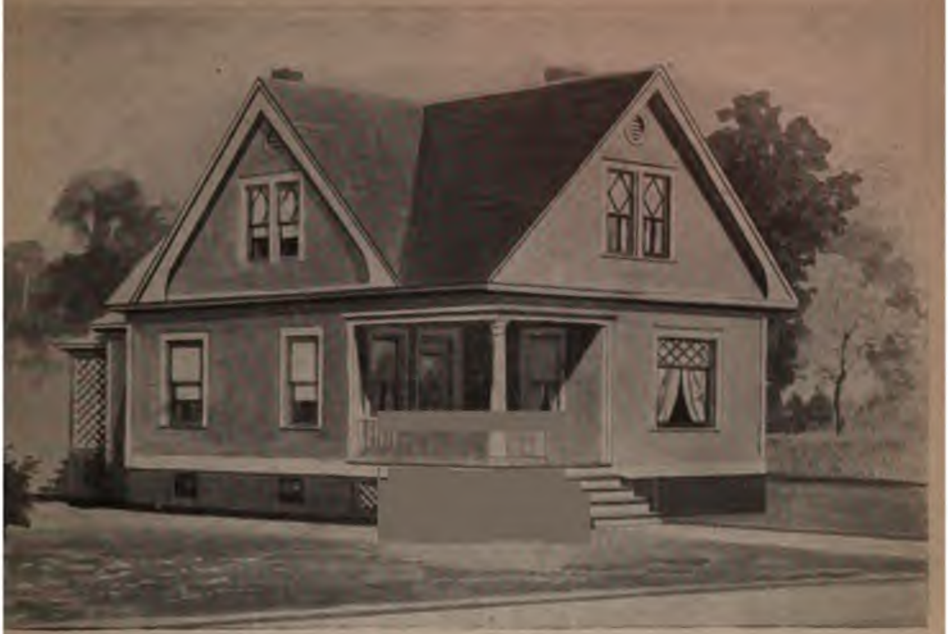


Second Floor Plan

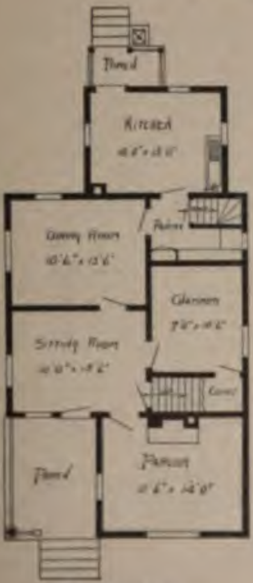
**Size: Width, 26 feet; length, 52 feet, exclusive of porch**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about *twenty* pages of typewritten matter.

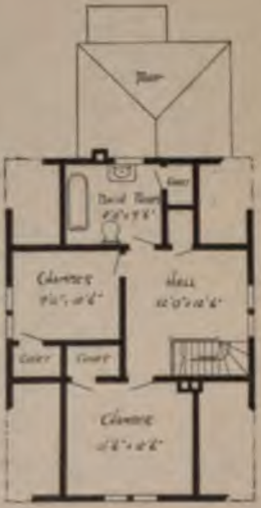
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $2,750.00 to about $3,000.00, according to the locality in which it is built.



## Design No. 1165



**First Floor Plan**



**Second Floor Plan**

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

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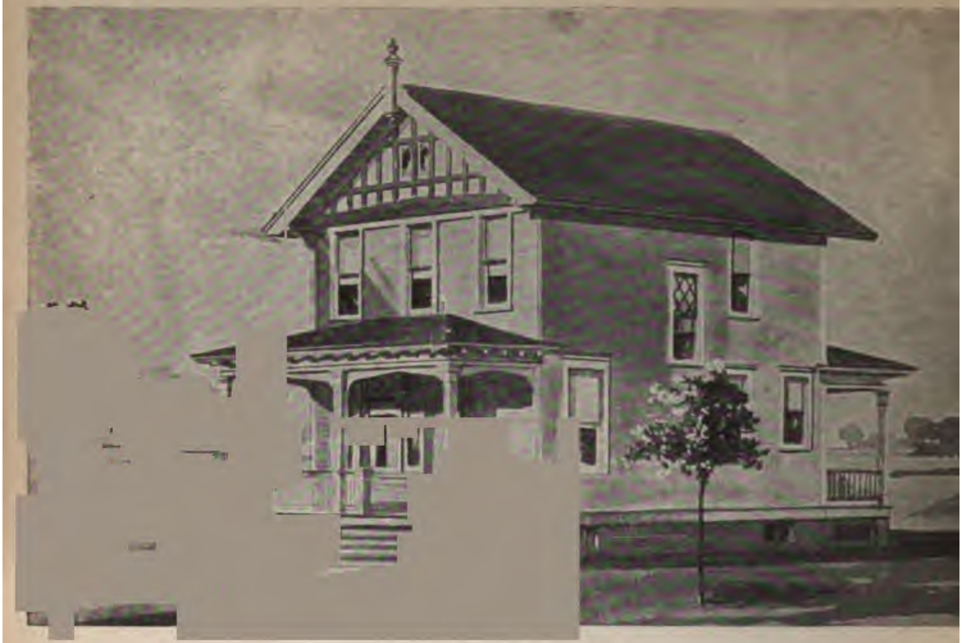
**$5.00**

We mail Plans and Specifications the same day order is received.

**Size: Width, 24 feet; length, 45 feet 6 inches, exclusive of porch**

Blue prints consist of cellar and foundation plan; first and second floor plan; ; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about fifteen pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,050.00 to about $1,200.00, according to the locality in which it is built.



## Design No. 1153

**PRICE**

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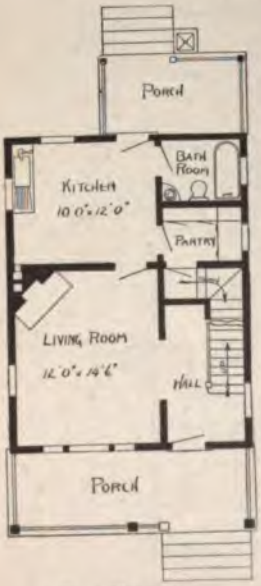
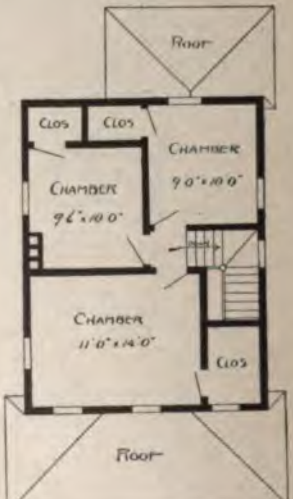


**First Floor Plan**

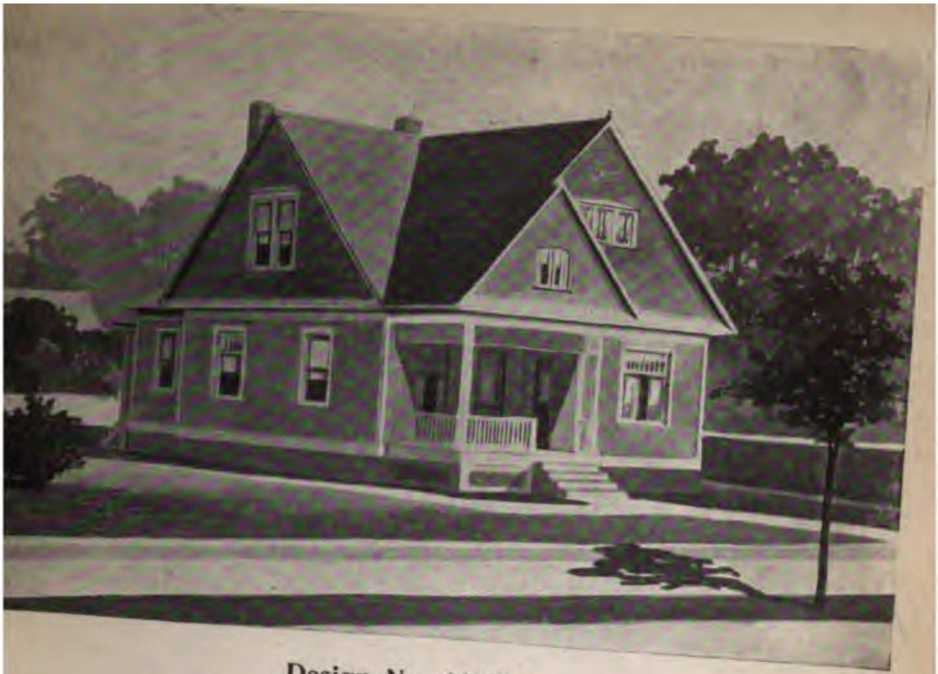


**Second Floor Plan**

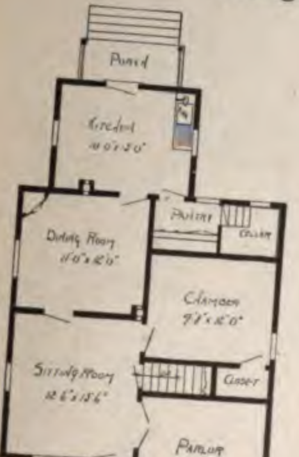
**Size: Width, 20 feet; length, 26 feet, exclusive of porches**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. *Specifications consist of about twenty pages of typewritten matter.*

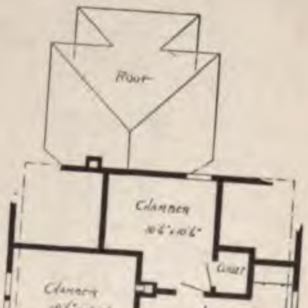
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,150.00 to about $1,300.00, according to the locality in which it is built.



## Design No. 1147



First Floor Plan



Second Floor Plan

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

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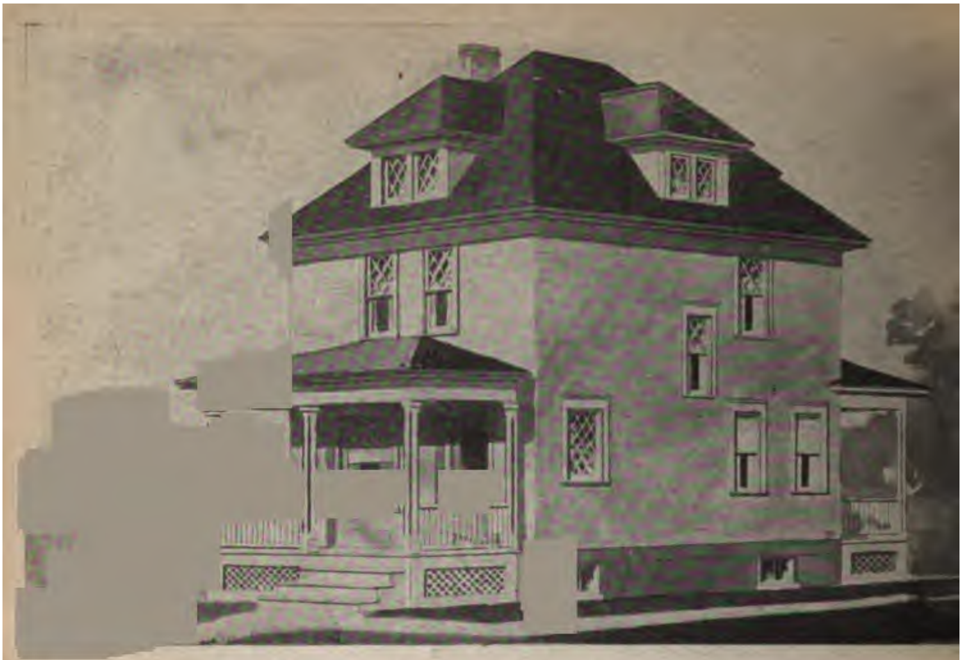
**$5.00**

We mail Plans and Specifications the same day order is received.

**Size: Width, 26 feet; length, 43 feet, exclusive of porches**

Blue prints consist of cellar and foun-
tion plan; first and second floor plans;
nt, rear, two side elevations; wall sec-
ns and all necessary interior details.
ecifications consist of about fifteen
ces of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,150.00 to about $1,300.00, according to the locality in which it is built.



## Design No. 1151

**PRICE**

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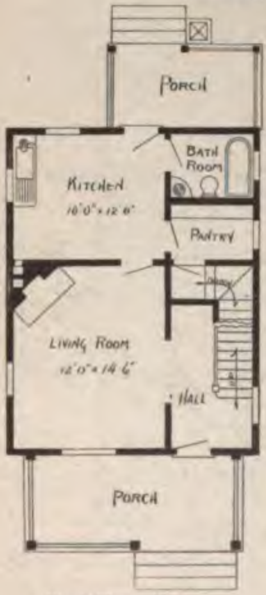
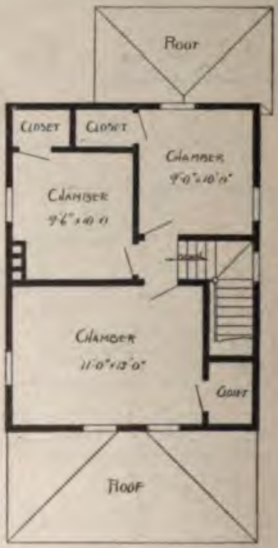


**First Floor Plan**

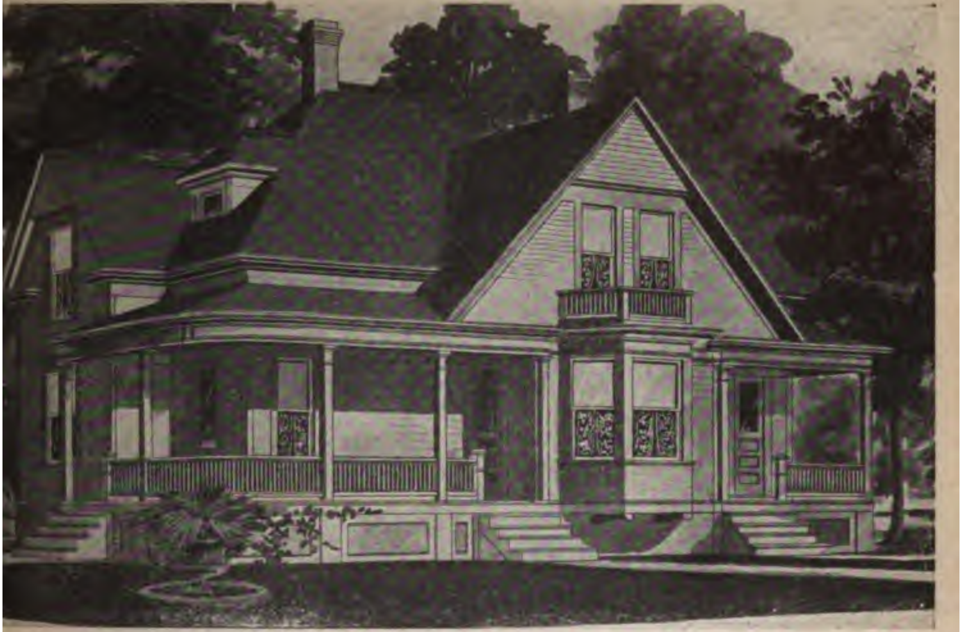


**Second Floor Plan**

**Size: Width, 20 feet; length, 26 feet, exclusive of porches**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about *twenty* pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,150.00 to about $1,300.00, according to the locality in which it is built.



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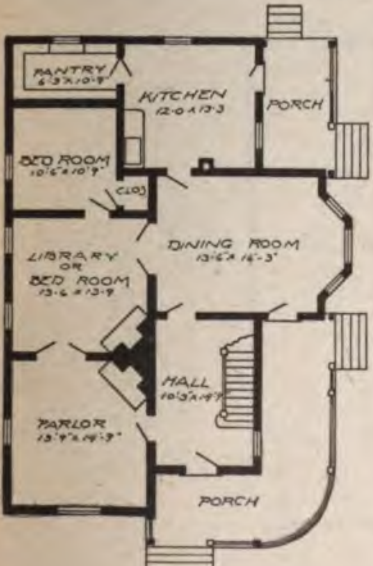
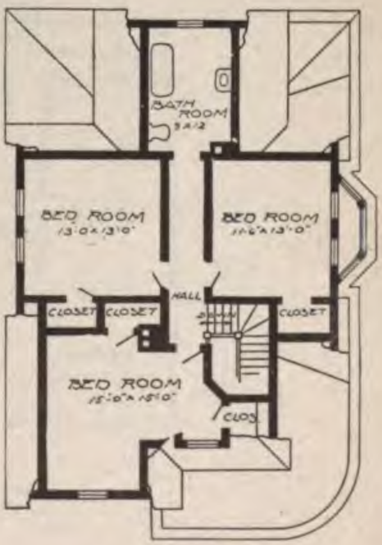


First Floor Plan



Second Floor Plan

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

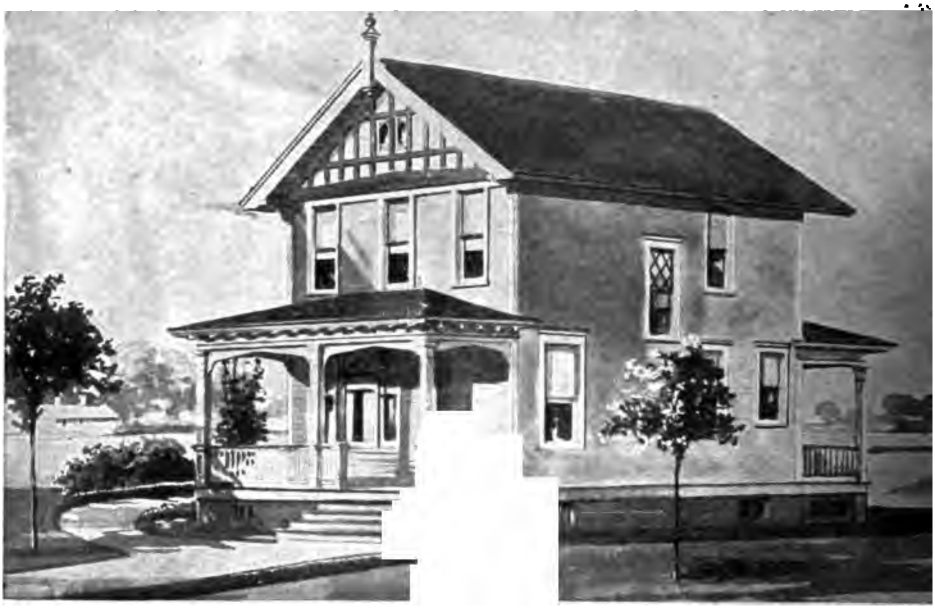
**$5.00**

They save time and prevent waste of material

**Size: Width, 30 feet; length, 45 feet, exclusive of porches**

Blue prints consist of cellar and foundation plan; roof plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about twenty pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,400.00 to about $1,600.00, according to the locality in which it is built.



## Design No. 1153

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

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**$5.00**

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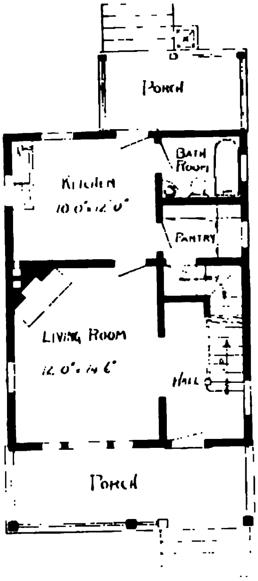
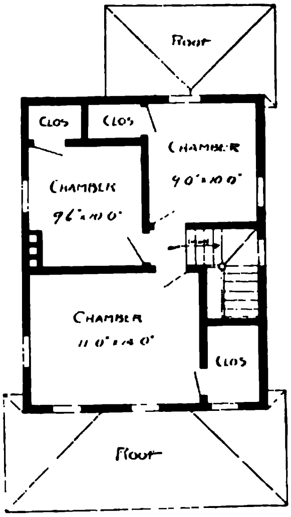


**First Floor Plan**

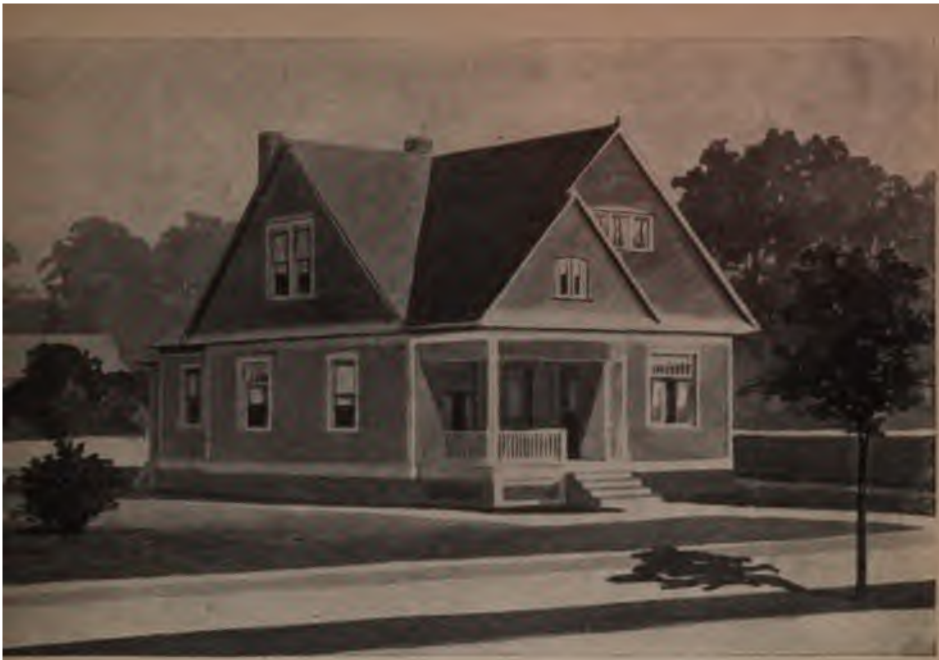


**Second Floor Plan**

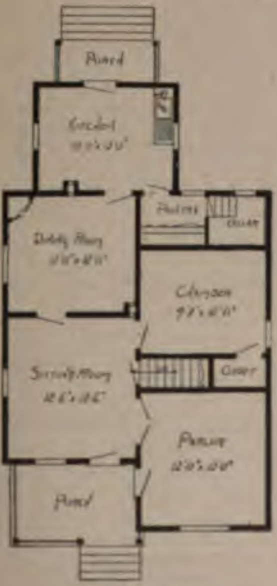
**Size: Width, 20 feet; length, 26 feet, exclusive of porches**

**Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall tions and all necessary interior details. fications consist of about twenty of typewritten matter.**

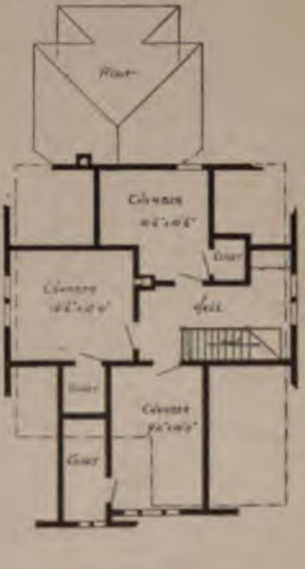
Full and complete working plans and specifications of this house will be furnished for $5.00. **Cost of this house is from about $1,150.00 to about $1,300.00, according to the locality in which it is built.**



## Design No. 1147



**First Floor Plan**



**Second Floor Plan**

**Size: Width, 26 feet; length, 43 feet, exclusive of porches**

**PRICE** of Blue Prints, together with a complete set of typewritten specifications is

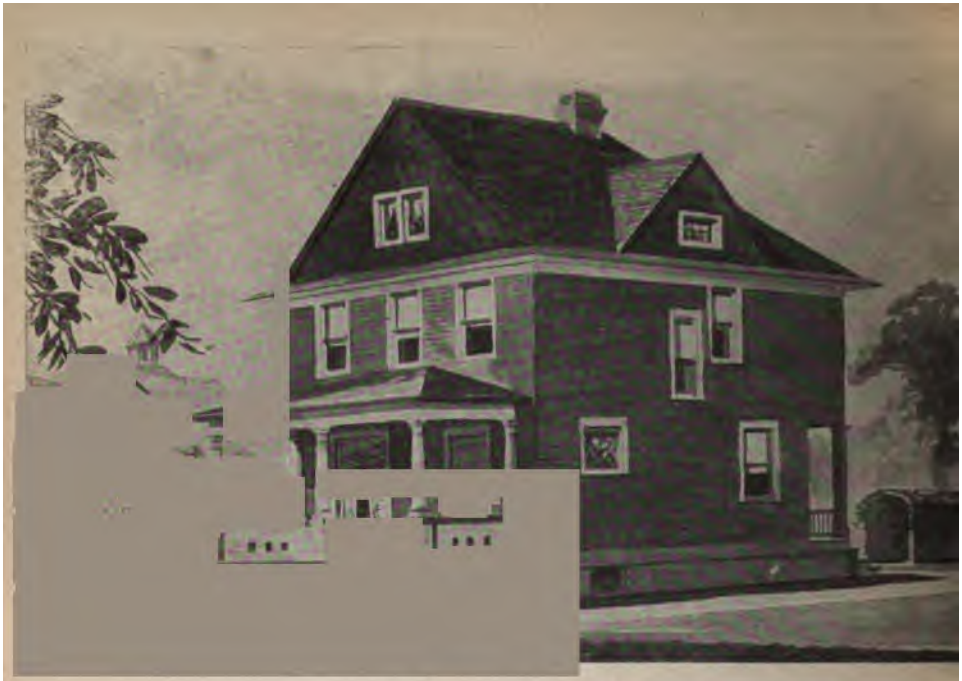
**ONLY**

**$5.00**

We mail Plans and Specifications the same day order is received.

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about fifteen pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,150.00 to about $1,300.00, according to the locality in which it is built.



## Design No. 1158

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

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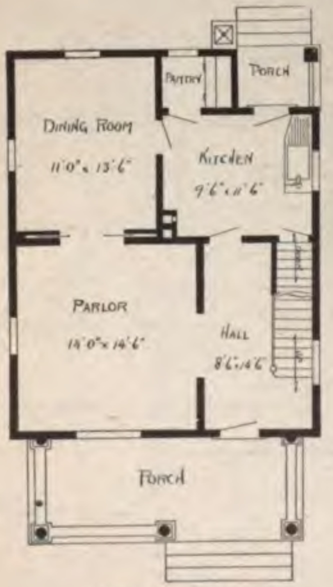
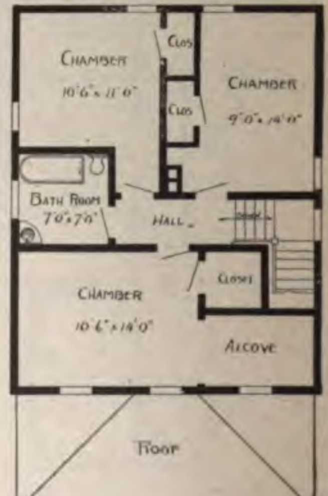


**First Floor Plan**

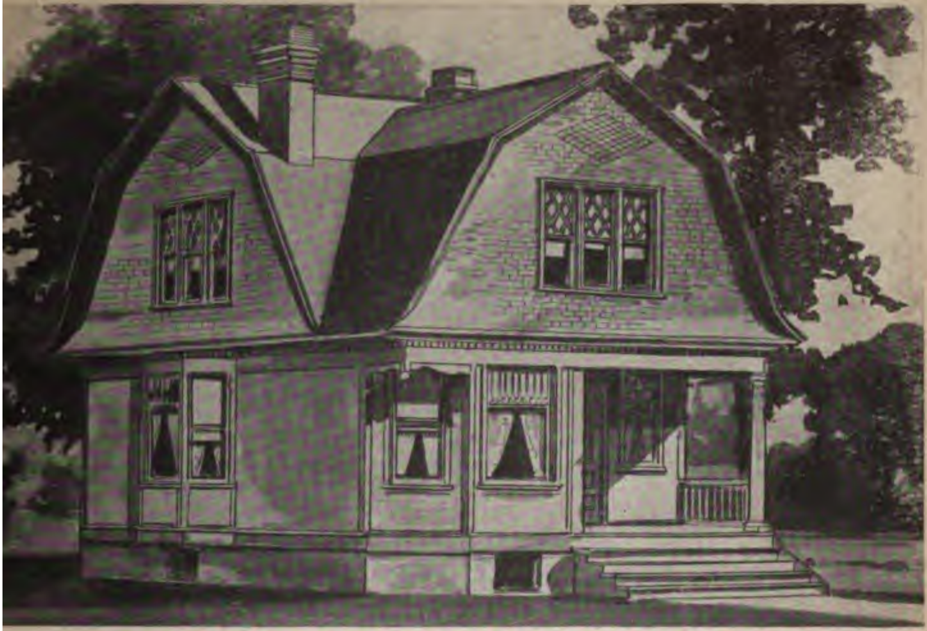


**Second Floor Plan**

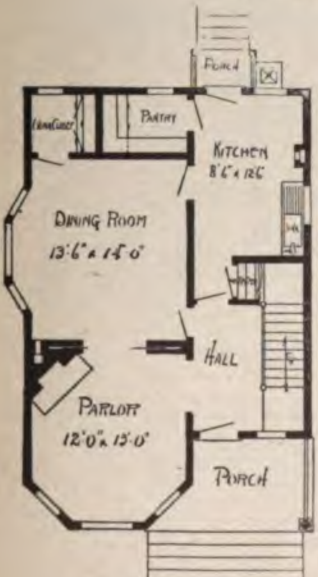
**Size: Width, 24 feet; length, 30 feet, exclusive of porch**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. *Specifications consist of about fifteen pages of typewritten matter.*

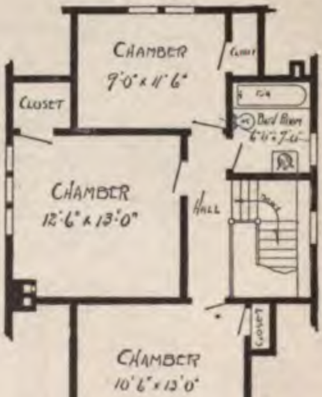
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,450.00 to about $1,600.00, according to the locality in which it is built.



## Design No. 1121



**First Floor Plan**



**Second Floor Plan**

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

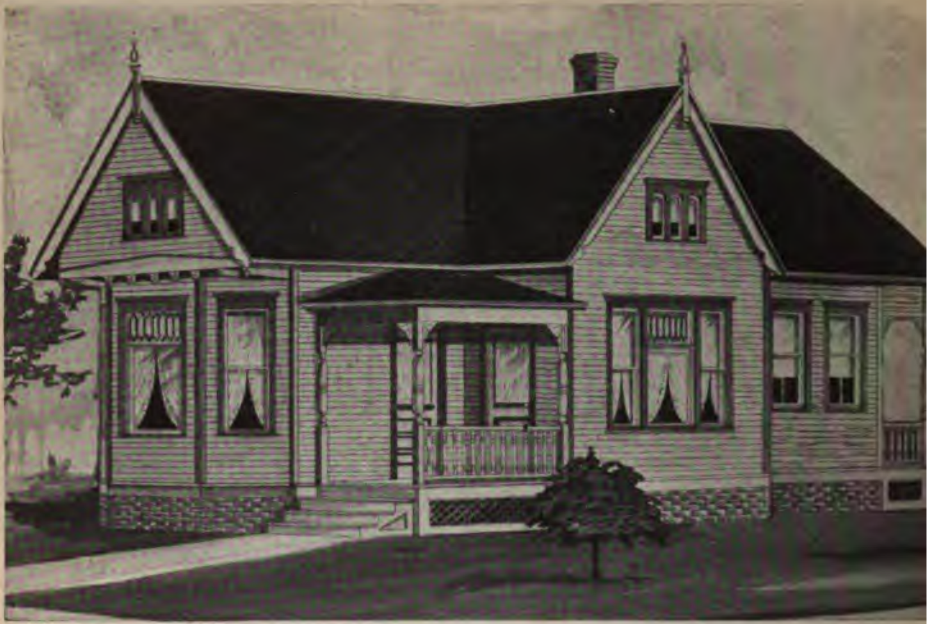
**$5.00**

They save time and prevent waste of material

**Size: Width, 23 feet 6 inches; length, 34 feet**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about fifteen pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,150.00 to about $1,350.00, according to the locality in which it is built.



## Design No. 1076

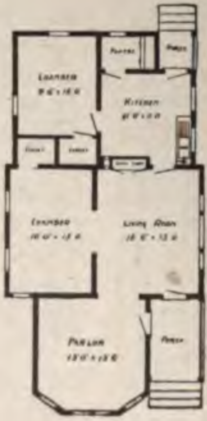
**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

**$5.00**

We mail Plans and Specifications the same day order is received.

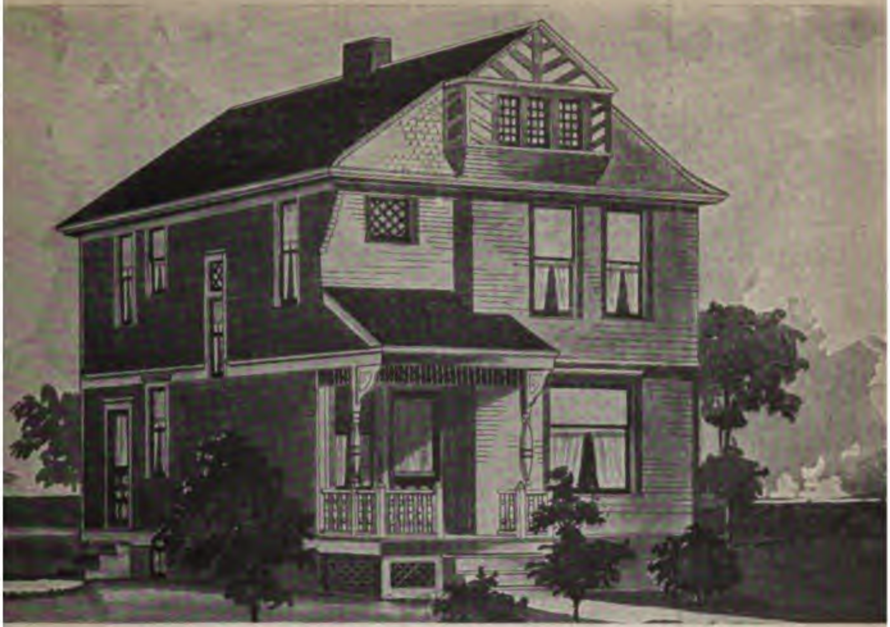


Floor Plan

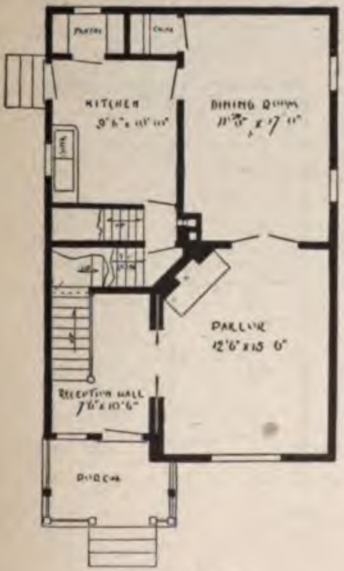
**Size: Width 24 feet; length, 46 feet**

Blue prints consist of foundation plan; *floor plan*; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about fifteen pages of typewritten matter.

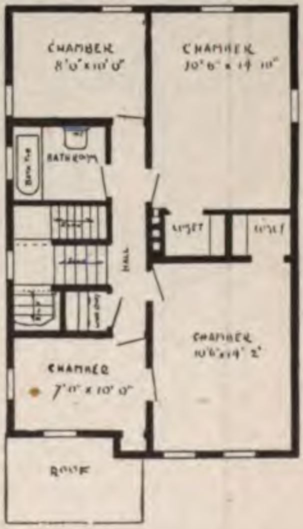
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,250.00 to about $1,400.00, according to the locality in which it is built.



## Design No. 1008



First Floor Plan



Second Floor Plan

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

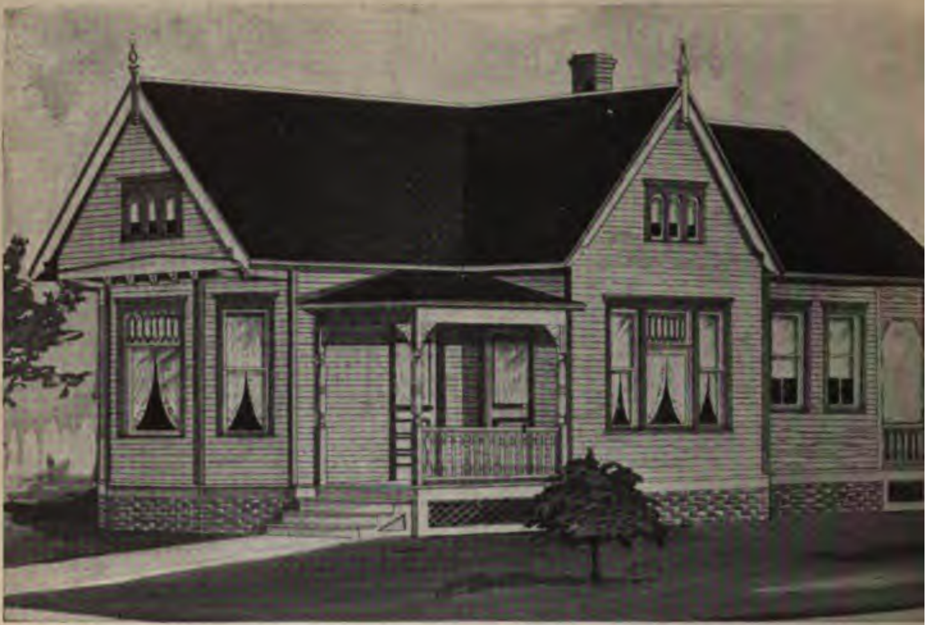
**$5.00**

We mail Plans and Specifications the same day order is received.

**Size: Width, 22 feet; length, 34 feet, exclusive of porch**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. *Specifications consist of about twenty pages of typewritten matter.*

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,850.00 to about $2,000.00, according to the locality in which it is built.



## Design No. 1076

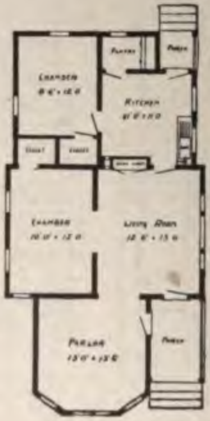
**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

**$5.00**

We mail Plans and Specifications the same day order is received.

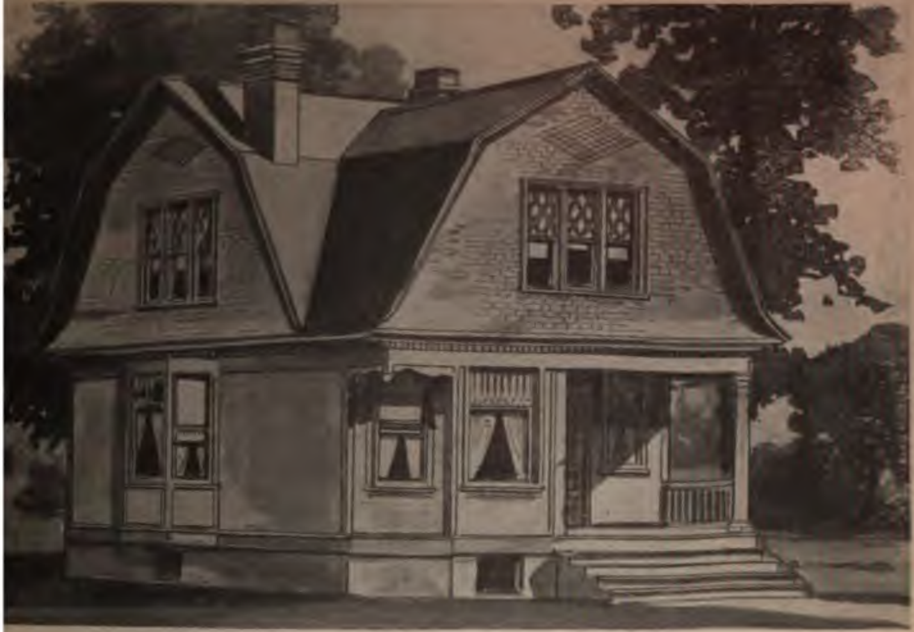


Floor Plan

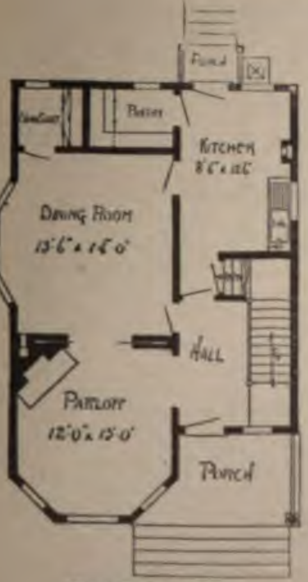
**Size: Width 24 feet; length, 46 feet**

Blue prints consist of foundation plan; floor plan; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about fifteen pages of typewritten matter.

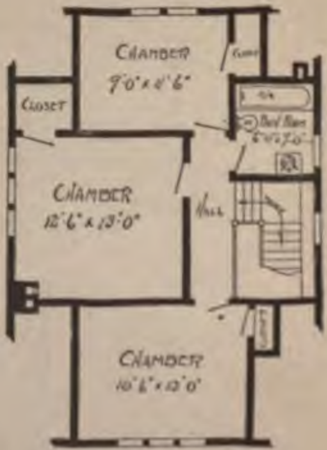
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,250.00 to about $1,400.00, according to the locality in which it is built.



## Design No. 1121



**First Floor Plan**



**Second Floor Plan**

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

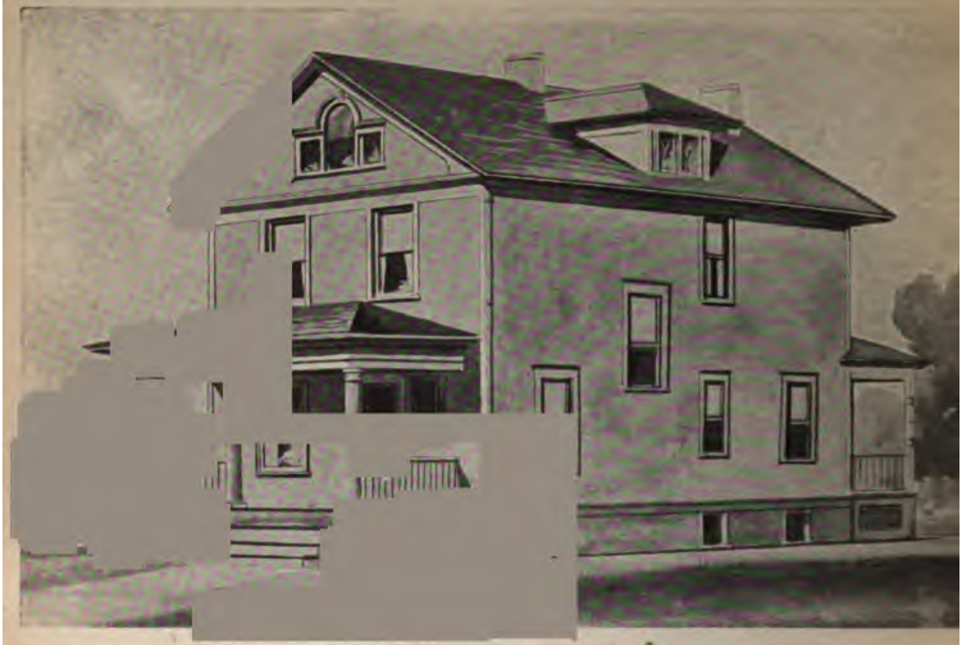
**$5.00**

They save time and prevent waste of material

**Size: Width, 23 feet 6 inches; length, 34 feet**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about fifteen pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,150.00 to about $1,350.00, according to the locality in which it is built.



## Design No. 1160

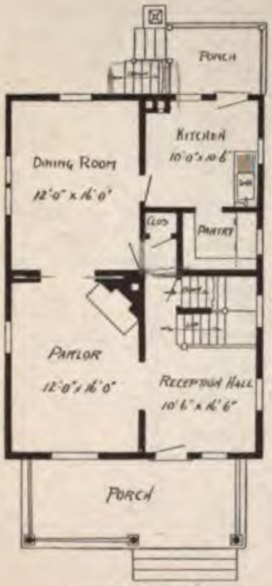
**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

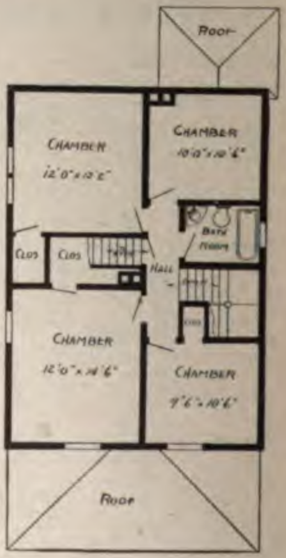
**ONLY**

**$5.00**

We mail Plans and Specifications the same day order is received.



**First Floor Plan**

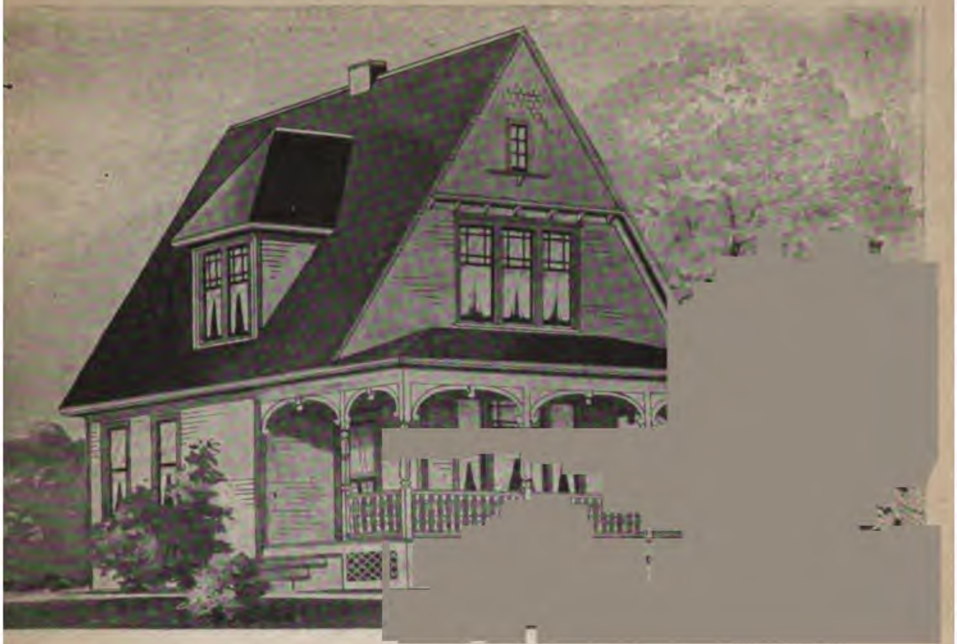


**Second Floor Plan**

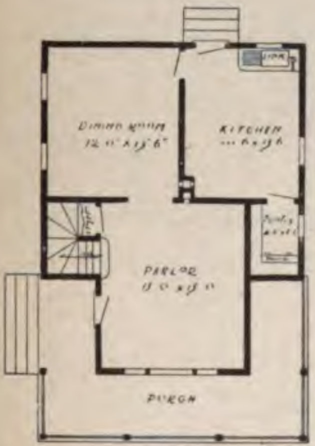
**Size: Width, 24 feet; length, 34 feet, exclusive of porches**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear two side elevations; wall sections and all necessary interior details. Specifications consist of about twenty pages of typewritten matter.

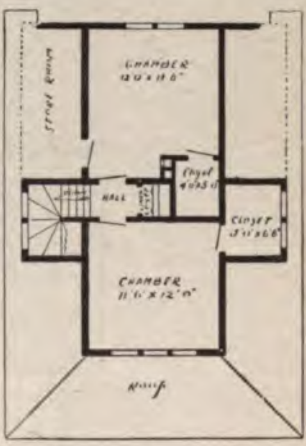
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,750.00 to about $1,900.00, according to the locality in which it is built.



## Design No. 1002



First Floor Plan



Second Floor Plan

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

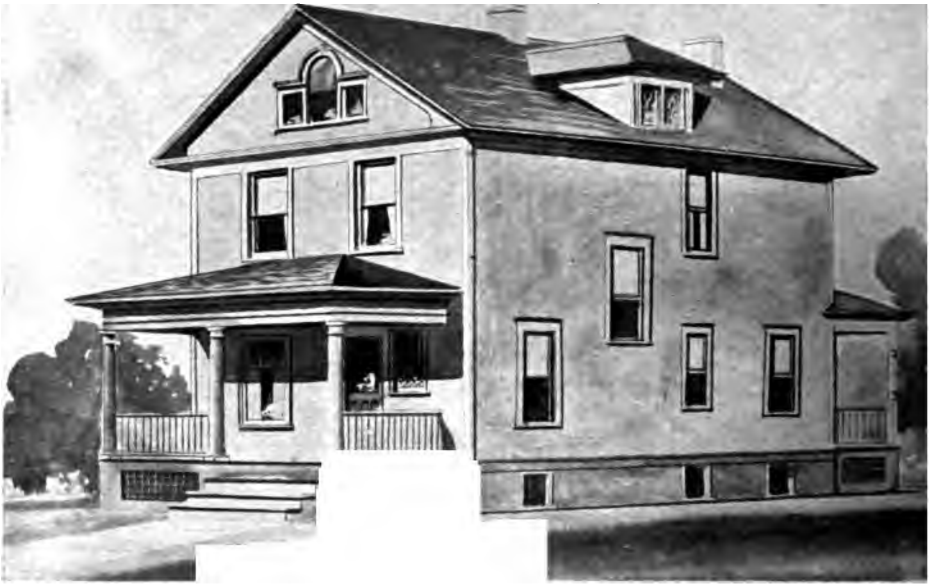
**$5.00**

We mail Plans and Specifications the same day order is received.

**Size: Width, 24 feet; length, 30 feet, exclusive of porches**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about 20 pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,250.00 to about $1,400.00, according to the locality in which it is built.



## Design No. 1160

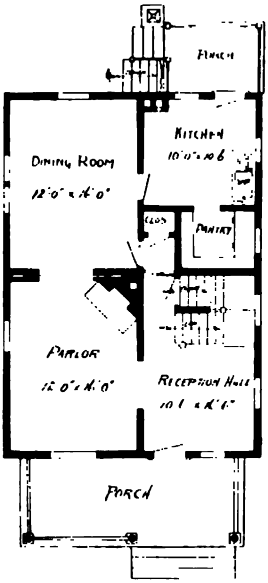
**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

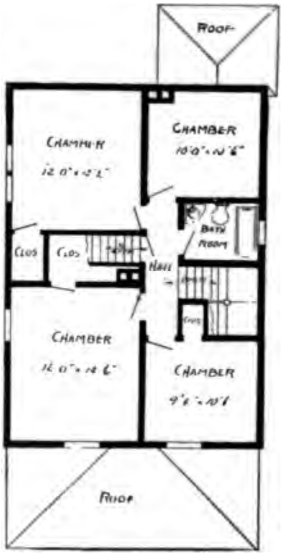
**ONLY**

**$5.00**

We mail Plans and Specifications the same day order is received.



First Floor Plan

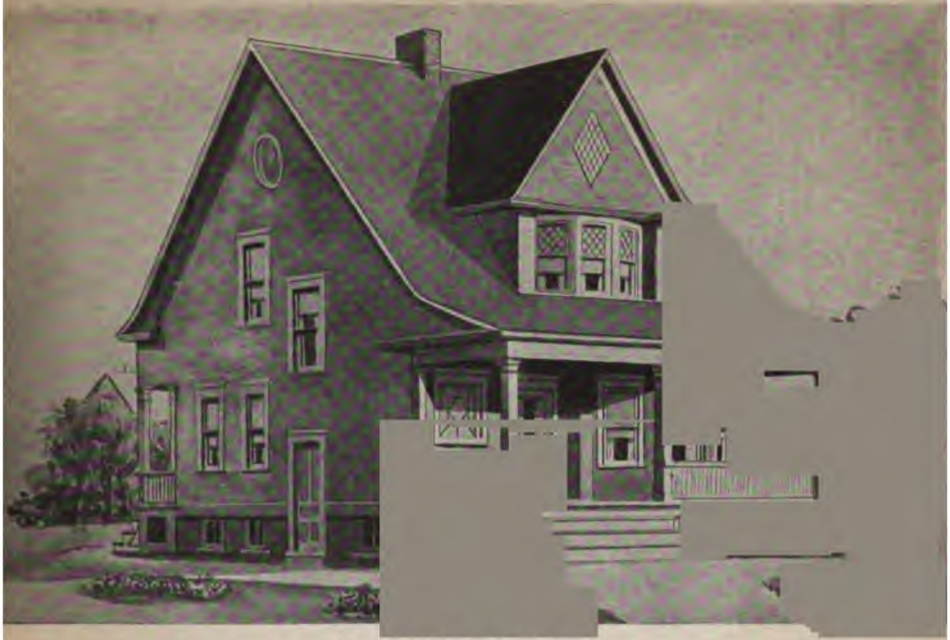


Second Floor Plan

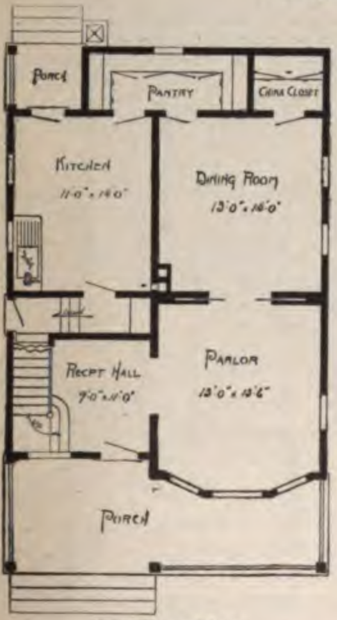
**Size: Width, 24 feet; length, 34 feet, exclusive of porches**

rints consist of cellar and foun-
first and second floor plans;
wo side elevations; wall
all necessary interior de-
cations consist of about
of typewritten matter.

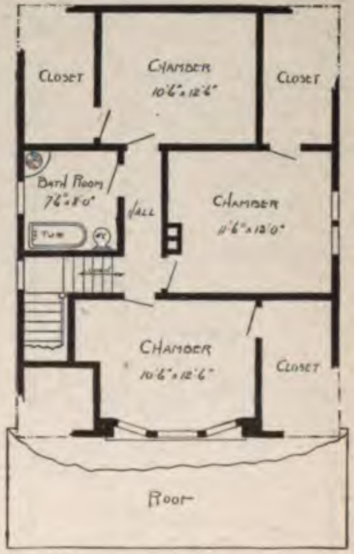
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,750.00 to about $1,900.00, according to the locality in which it is built.



## Design No. 1150



First Floor Plan



Second Floor Plan

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

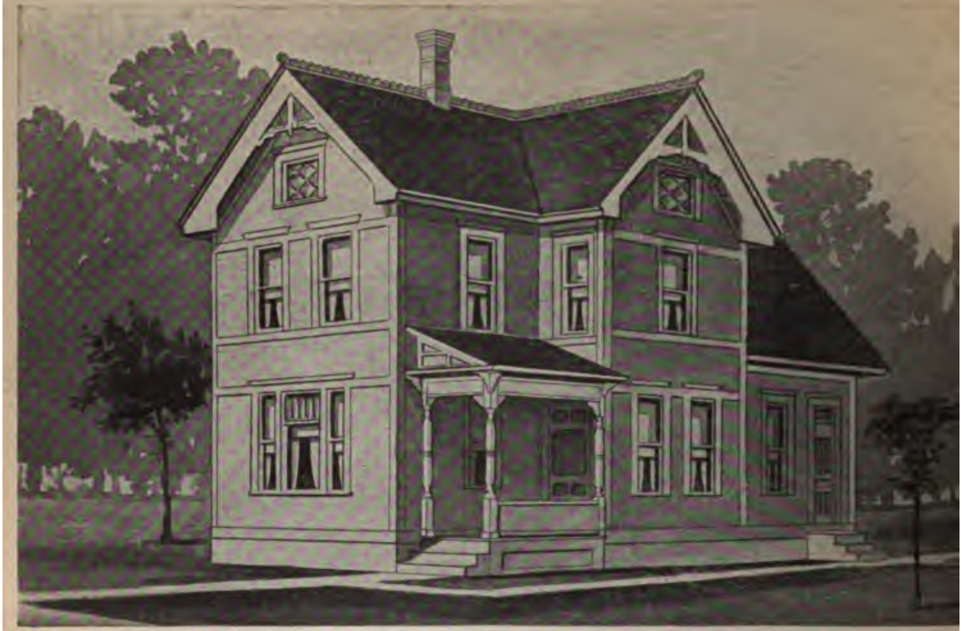
**$5.00**

We mail Plans and Specifications the same day order is received.

**Size: Width, 25 feet 6 inches; length, 36 feet, exclusive of porch**

Blue prints consist of cellar and foundation plan; roof plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary *interior details. Specifications consist of about twenty pages of typewritten matter*

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,500.00 to about $1,650.00, according to the locality in which it is built.



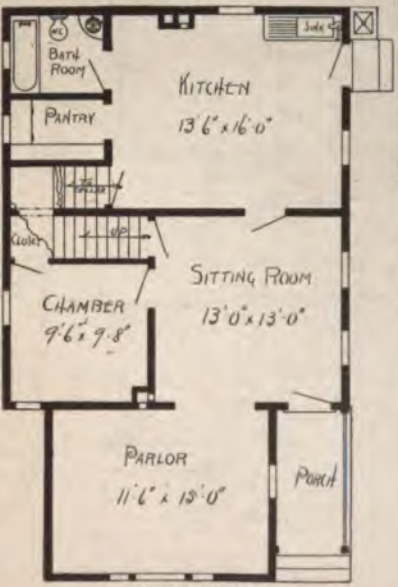
## Design No. 1123

**PRICE**
of Blue Prints, together with a complete set of typewritten specifications is

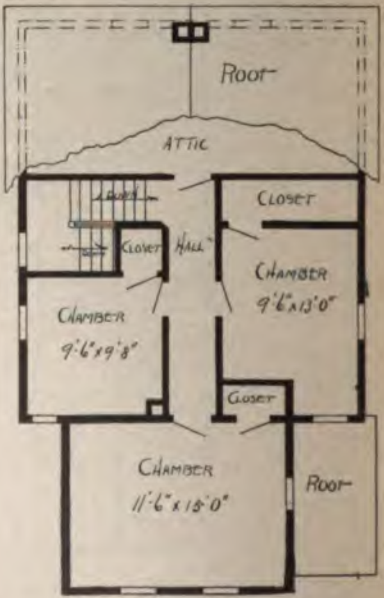
**ONLY**

**$5.00**

They save time and prevent waste of material



**First Floor Plan**

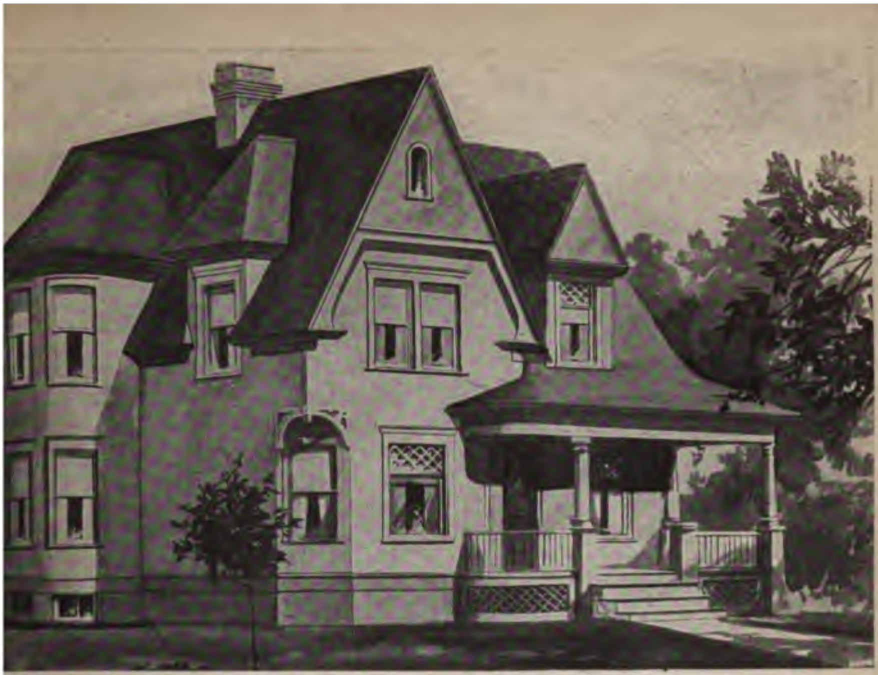


**Second Floor Plan**

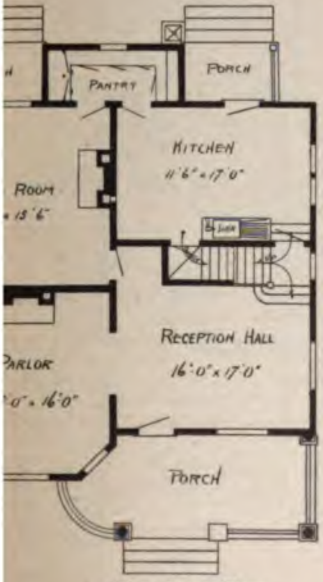
**Size: Width, 24 feet; Length, 39 feet 6 inches**

Blue prints consist of cellar and foundation plan; first and second floor plans; *front*, rear, two side elevations; wall *sections* and all necessary interior details. *Specifications* consist of about twenty *pages of* typewritten matter.

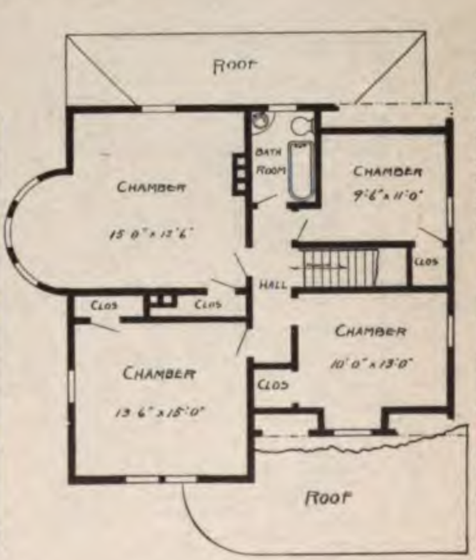
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,225.00 to about $1,450.00, according to the locality in which it is built.



## Design No. 1156



**First Floor Plan**



**Second Floor Plan**

**Size: Width, 39 feet; length, 38 feet, exclusive of porches**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about twenty *pages of typewritten* matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $3,250.00 to about $3,500.00, according to the locality in which it is built.

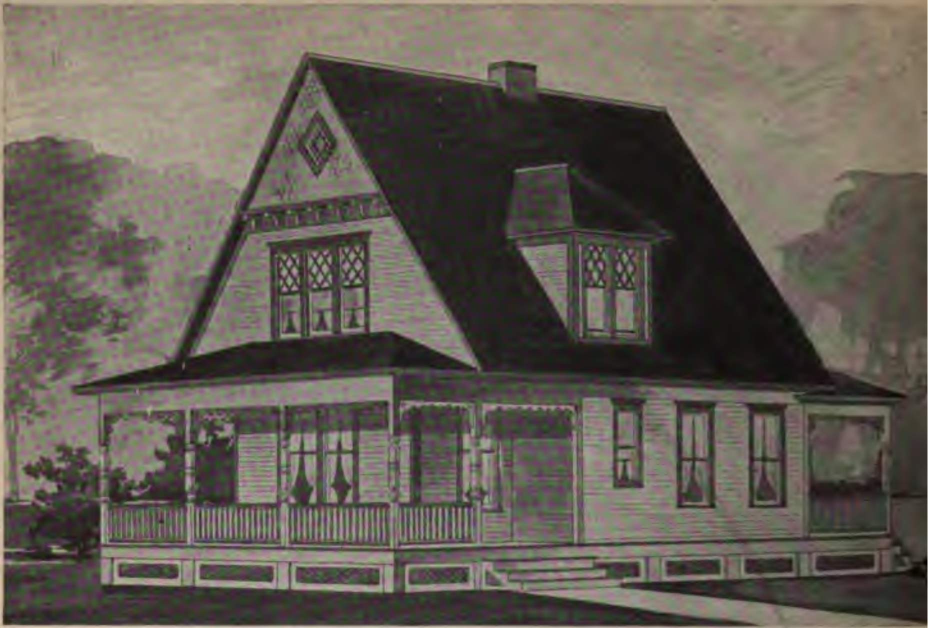
**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

**$5.00**

We mail Plans and Specifications the same day order is received.



## Design No. 1072

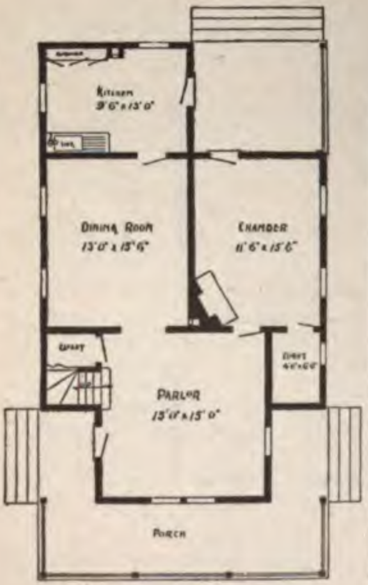
**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

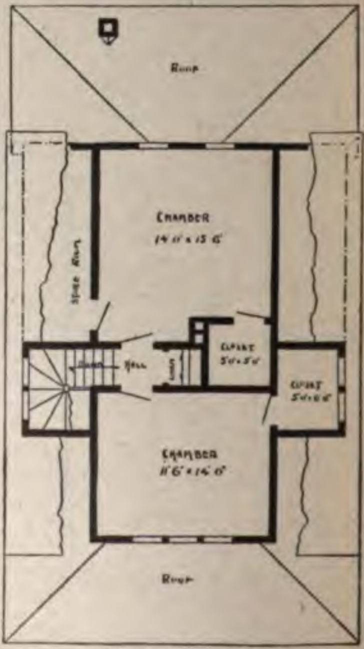
**ONLY**

**$5.00**

We mail Plans and Specifications the same day order is received.



First Floor Plan

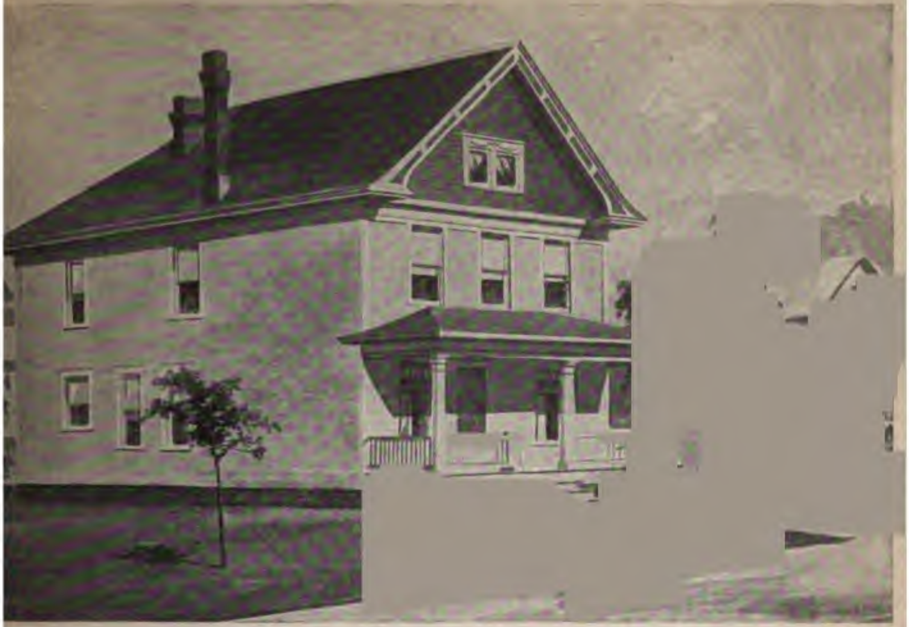


Second Floor Plan

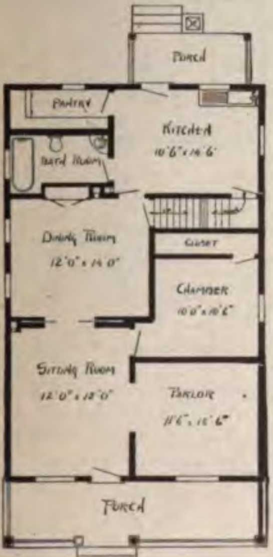
**Size: Width, 26 feet; length, 42 feet, exclusive of porch**

Blue prints consist of foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about twenty pages of typewritten matter.

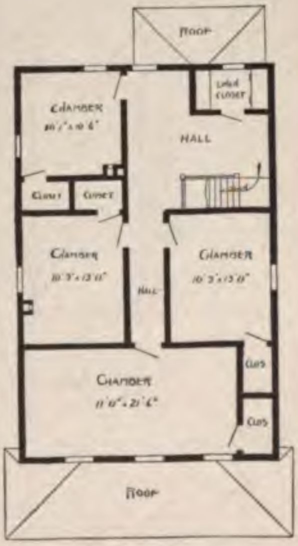
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,250.00 to about $1,400.00, according to the locality in which it is built.



## Design No. 1159



**First Floor Plan**



**Second Floor Plan**

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

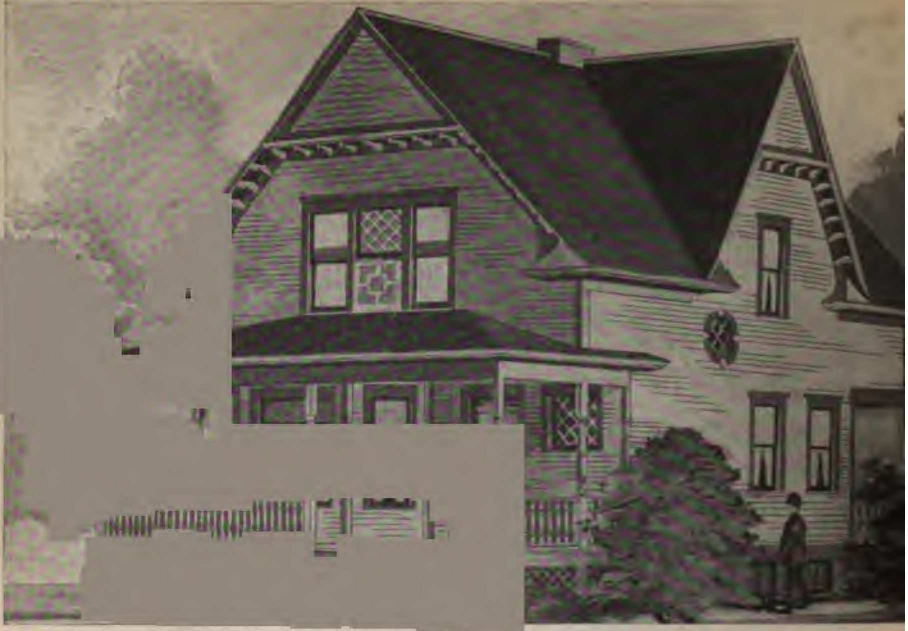
**$5.00**

We mail Plans and Specifications the same day order is received.

**Size: Width, 26 feet; length, 40 feet, exclusive of porches**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about fifteen pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $2,150.00 to about $2,350.00, according to the locality in which it is built.



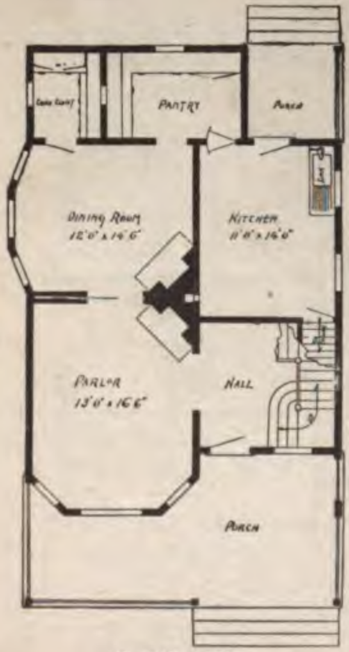
## Design No. 1057

**PRICE**
of Blue Prints, together with a complete set of typewritten specifications is

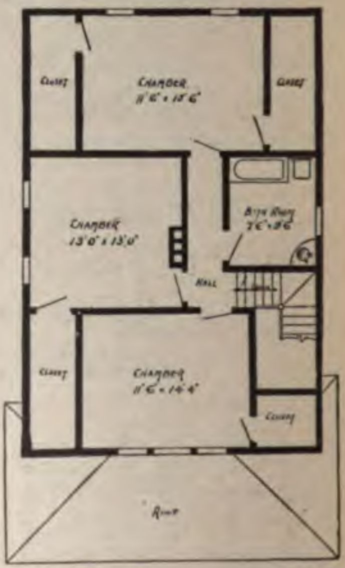
**ONLY**

**$5.00**

We mail Plans and Specifications the same day order is received.



First Floor Plan

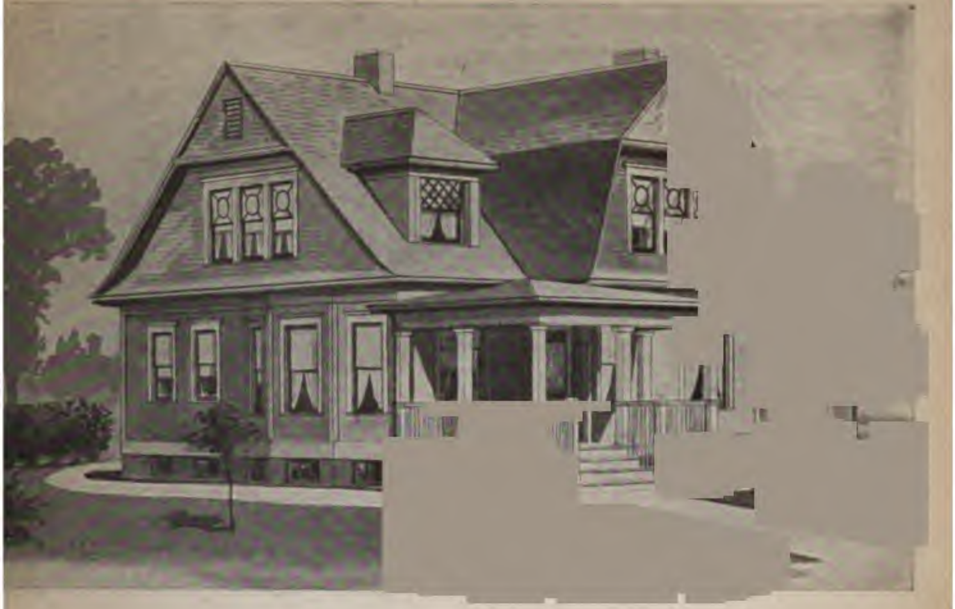


Second Floor Plan

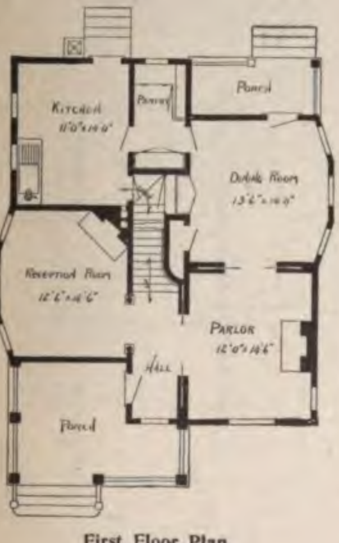
**Size: Width, 27 feet; length, 38 feet**

Blue prints consist of cellar and foundation plan; first and second floor plans; *front*, rear, two side elevations; wall sections and all necessary interior details. *Specifications* consist of about twenty *pages of* typewritten matter.

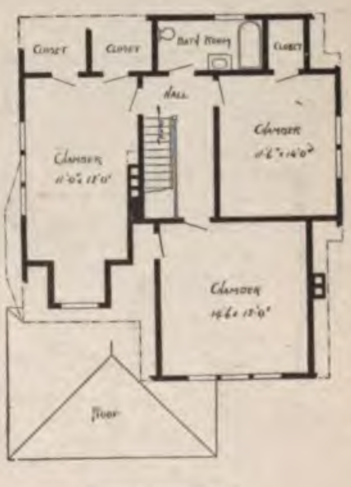
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,850.00 to about $2,000.00, according to the locality in which it is built.



## Design No. 1152



**First Floor Plan**



**Second Floor Plan**

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

**ONLY**

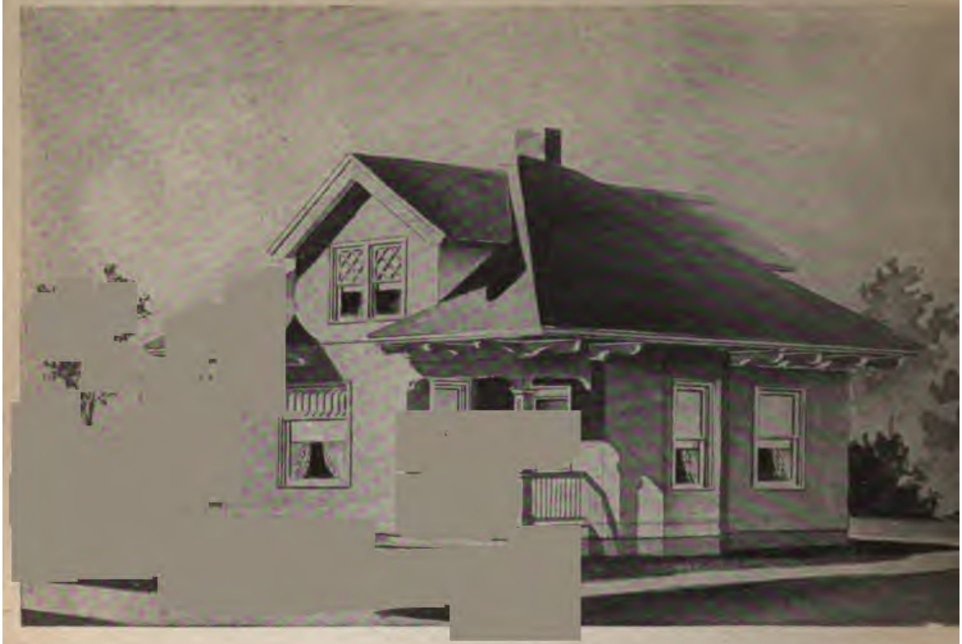
**$5.00**

We mail Plans and Specifications the same day order is received.

**Size: Width, 33 feet; length, 36 feet, exclusive of porch**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. *Specifications consist of about fifteen pages of typewritten matter.*

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,650.00 to about $1,850.00, according to the locality in which it is built.



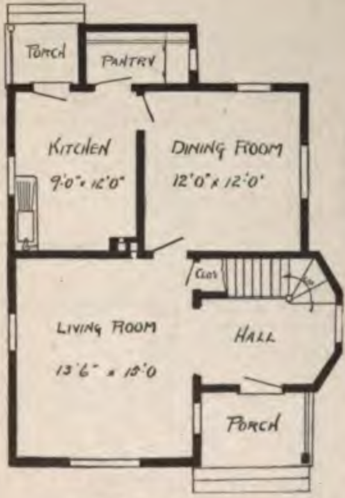
## Design No. 1155

**PRICE**
of Blue Prints, together with a complete set of typewritten specifications is

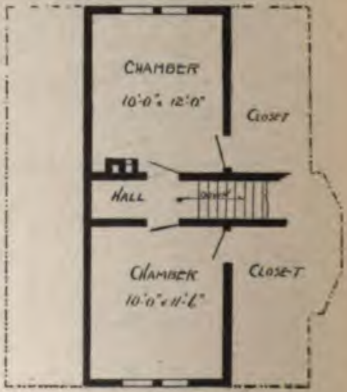
**ONLY**

**$5.00**

We mail Plans and Specifications the same day order is received.



**First Floor Plan**

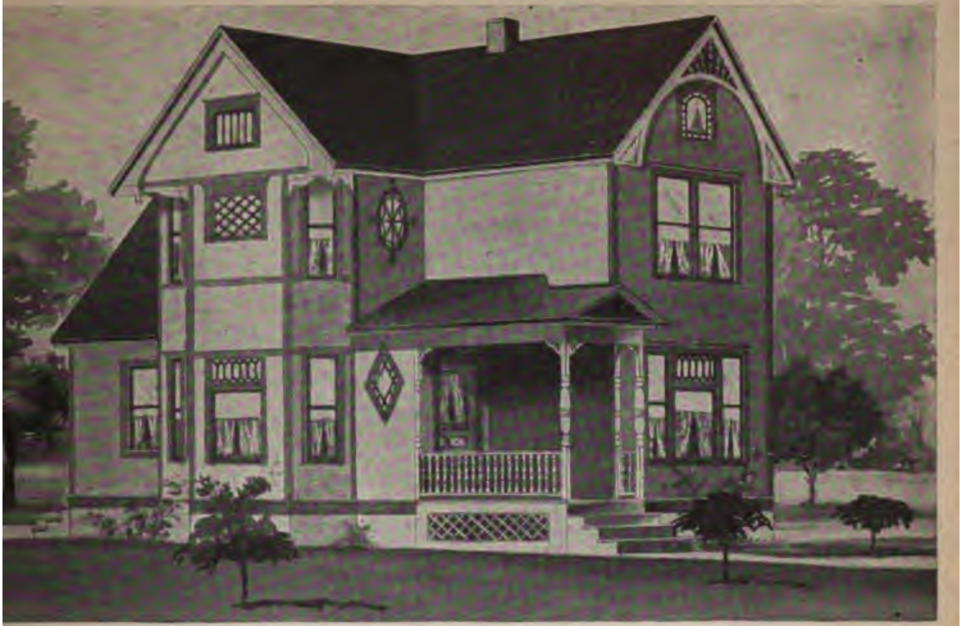


**Second Floor Plan**

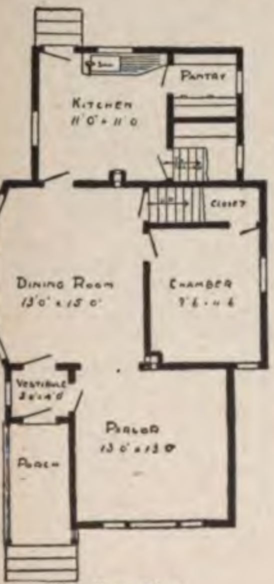
**Size: Width, 25 feet; length, 33 feet, exclusive of porch**

Blue prints consist of foundation plan; *first* and second floor plans; front, rear, *two side* elevations; wall sections and *all* necessary interior details. Specifications consist of about fifteen pages of *typewritten* matter.

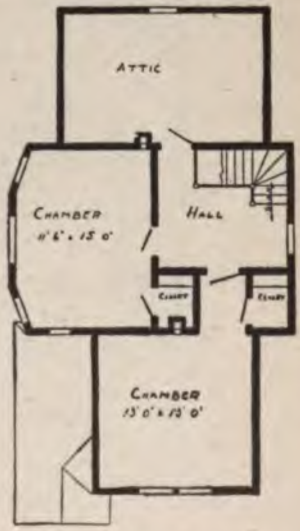
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $950.00 to about $1,100.00, according to the locality in which it is built.



## Design No. 1034



First Floor Plan



Second Floor Plan

**PRICE**

of Blue Prints, together with a complete set of typewritten specifications is

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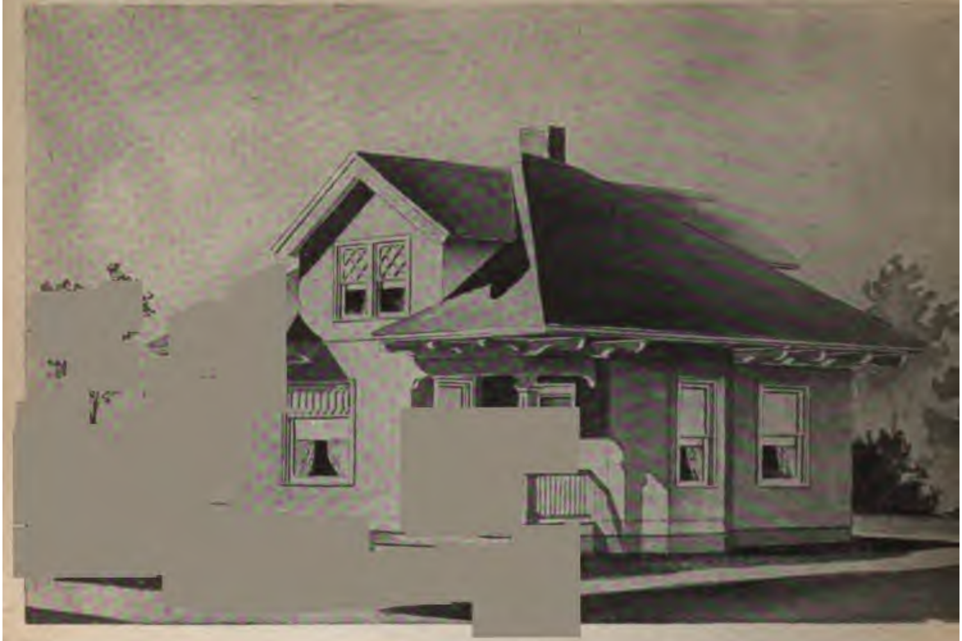
**$5.00**

We mail Plans and Specifications the same day order is received.

**Size: Width, 24 feet; length, 41 feet**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about twenty pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,750.00 to about $1,900.00, according to the locality in which it is built.



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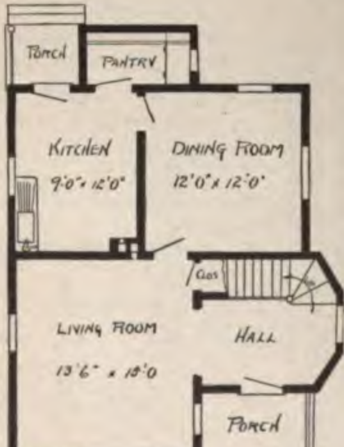
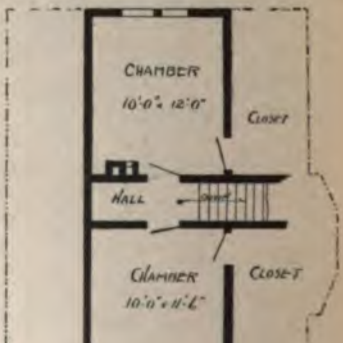


**First Floor Plan**

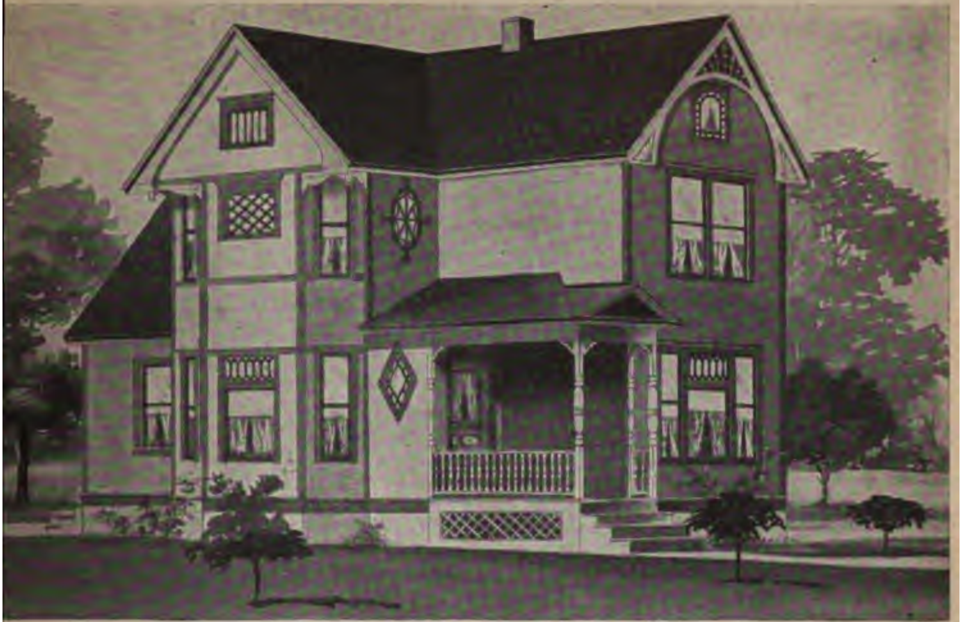


**Second Floor Plan**

**Size: Width, 25 feet; length, 33 feet, exclusive of porch**

Blue prints consist of foundation plan; *first* and second floor plans; front, rear, *two side* elevations; wall sections and *all necessary* interior details. Specifications consist of about fifteen pages of *typewritten* matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $950.00 to about $1,100.00, according to the locality in which it is built.



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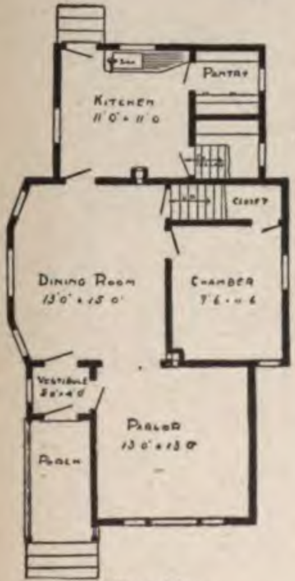
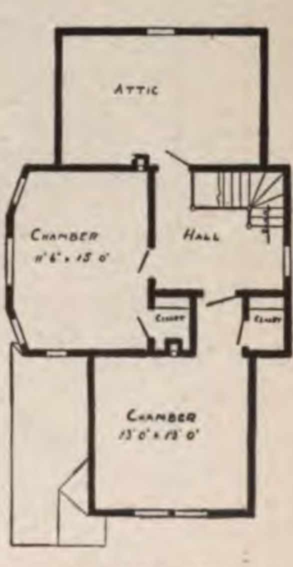


First Floor Plan



Second Floor Plan

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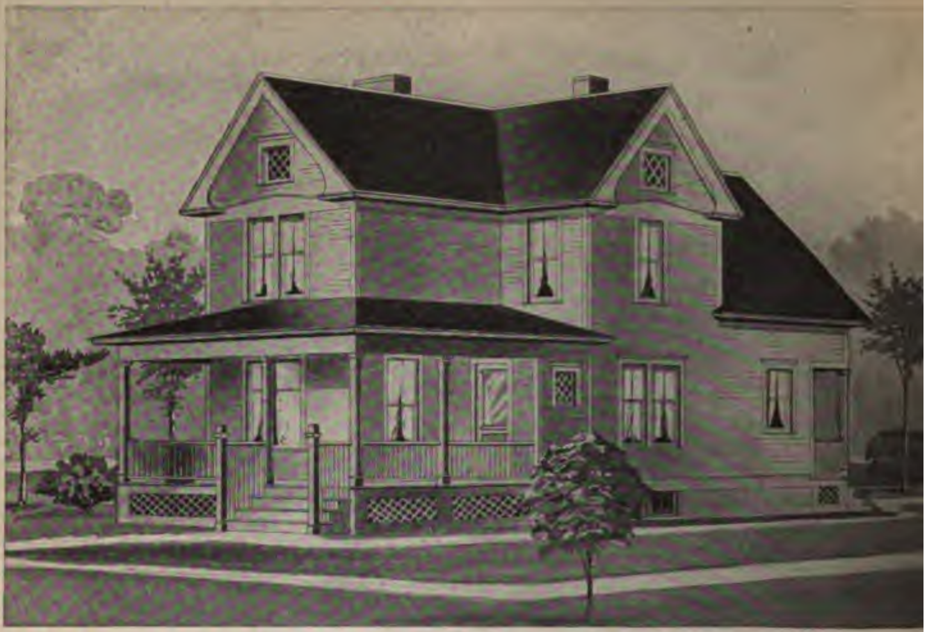
**Size: Width, 24 feet; length, 41 feet**

Blue prints consist of cellar and foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about twenty pages of typewritten matter.

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,750.00 to about $1,900.00, according to the locality in which it is built.



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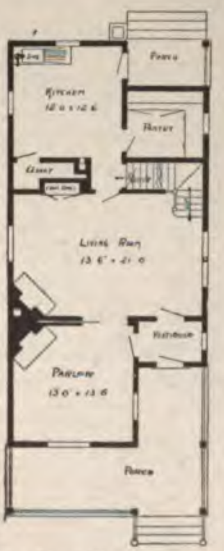
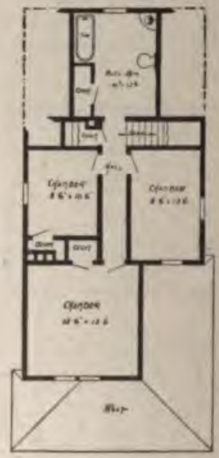


First Floor Plan

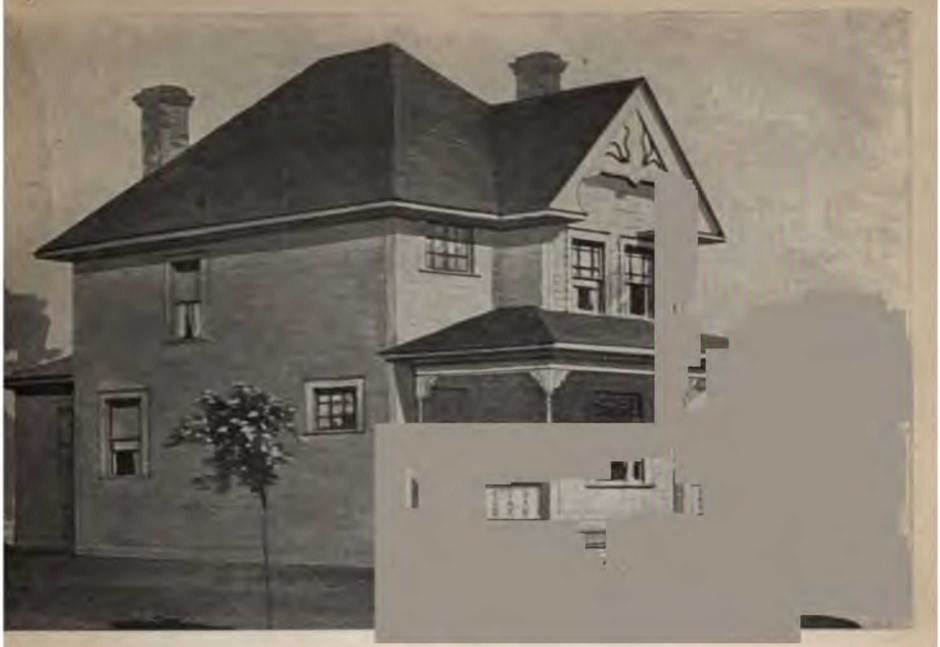


Second Floor Plan

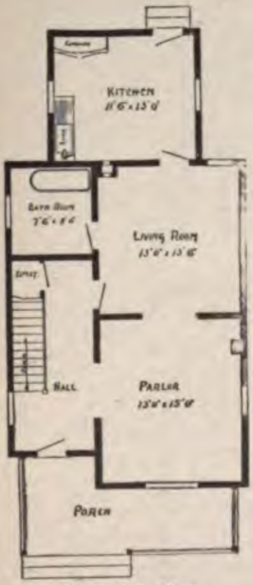
Size: Width, 22 feet; length, 45 feet, exclusive of porch

Blue prints consist of cellar and foundation plan; first and second floor plans; *front, rear,* two side elevations; wall sections and all necessary interior details. *Specifications* consist of about fifteen pages of typewritten matter.

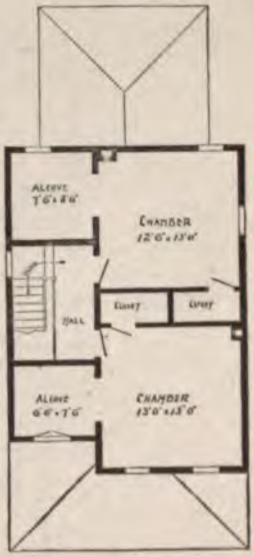
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,750.00 to about $1,900.00, according to the locality in which it is built.



## Design No. 1061



First Floor Plan



Second Floor Plan

**PRICE**

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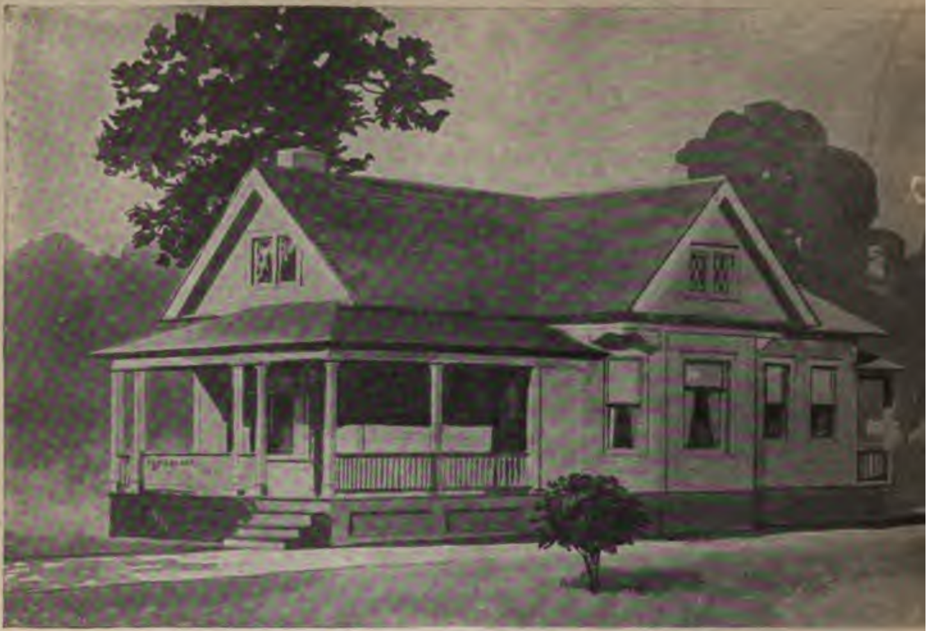
We mail Plans and Specifications the same day order is received.

**Size: Width, 22 feet; length, 42 feet, exclusive of porch**

Blue prints consist of foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. *Specifications consist of* about fifteen pages of *typewritten matter.*

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,350.00 to about $1,500.00, according to the locality in which it is built.



## Design No. 1162

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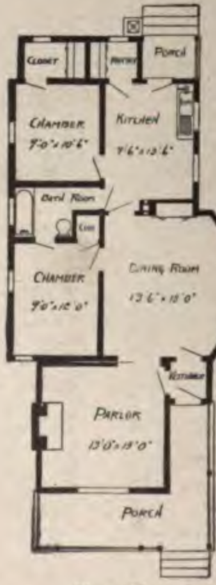
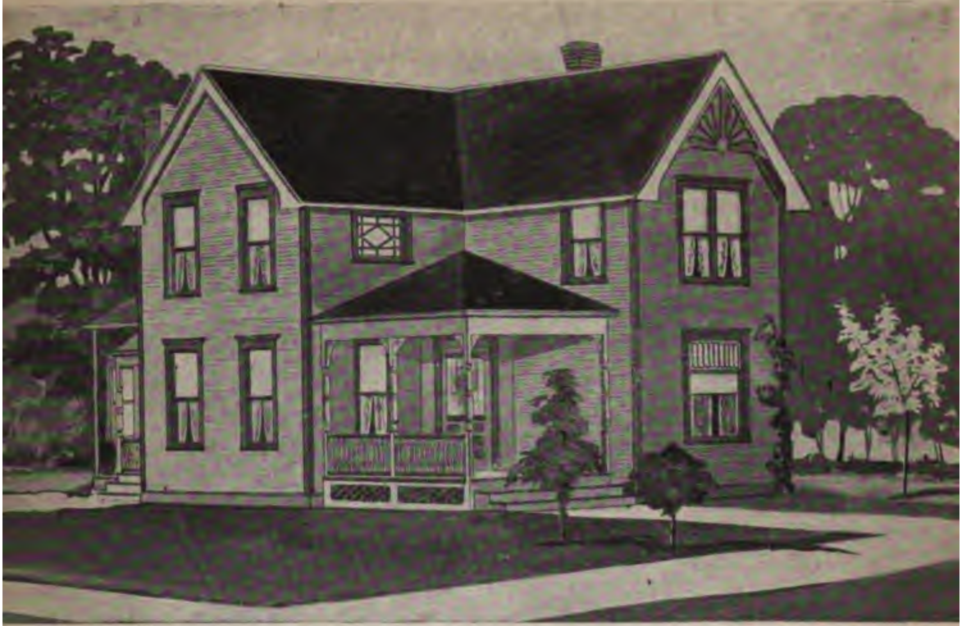


Floor Plan

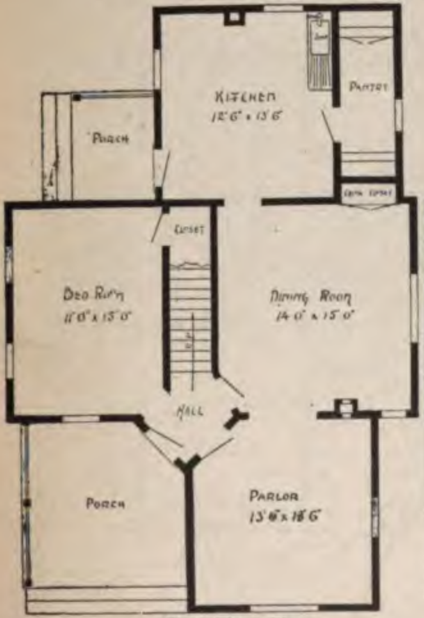
**Size: Width, 24 feet; length, 48 feet 6 inches, exclusive of porch**

Blue prints consist of foundation plan; *floor* plan; front, rear, two side elevations; wall sections and all necessary *interior* details. Specifications consist *of* about twelve pages of typewritten *matter.*

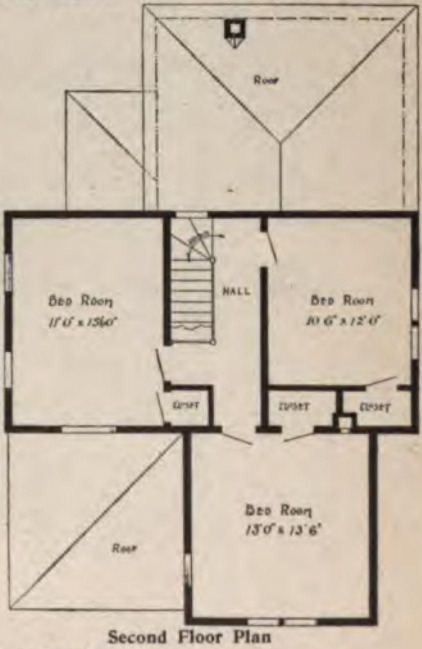
Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,350.00 to about $1,500.00, according to the locality in which it is built.



## Design No. 1074



First Floor Plan



Second Floor Plan

**Size: Width, 30 feet; length, 44 feet**

Blue prints consist of foundation plan; first and second floor plans; front, rear, two side elevations; wall sections and all necessary interior details. Specifications consist of about twenty pages of *typewritten matter.*

Full and complete working plans and specifications of this house will be furnished for $5.00. Cost of this house is from about $1,650.00 to about $1,800.00, according to the locality in which it is built.

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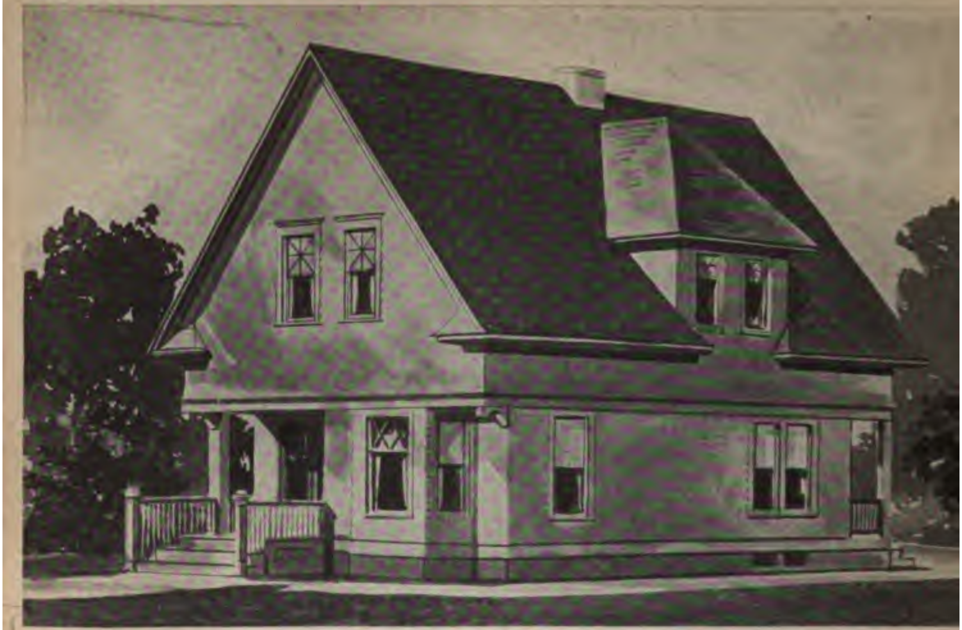

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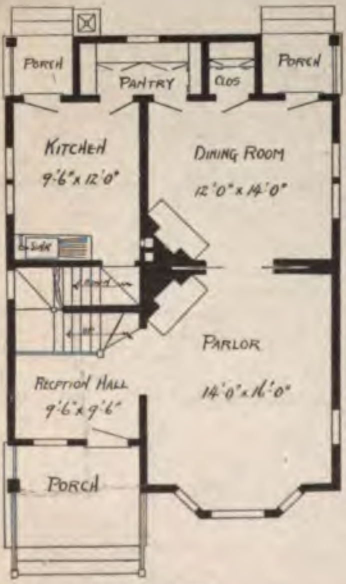
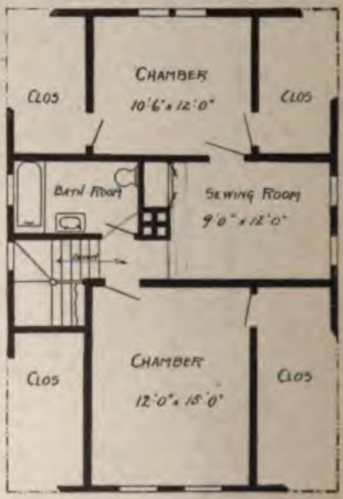


First Floor Plan



Second Floor Plan

**Size: Width, 25 feet; length, 36 feet 6 inches, exclusive of porches**

Blue prints consist of cellar and foundation plan; first and second floor plans; *front, rear,* two side elevations; wall *sections and* all necessary interior *details. Specifications* consist of about *fifteen pages* of typewritten matter.

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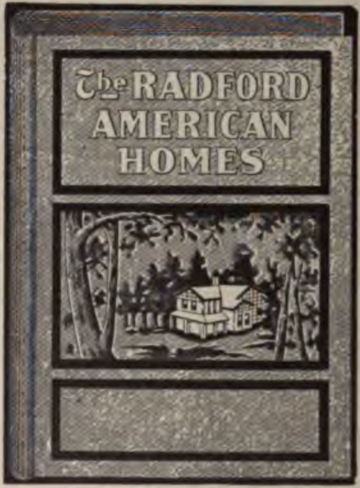

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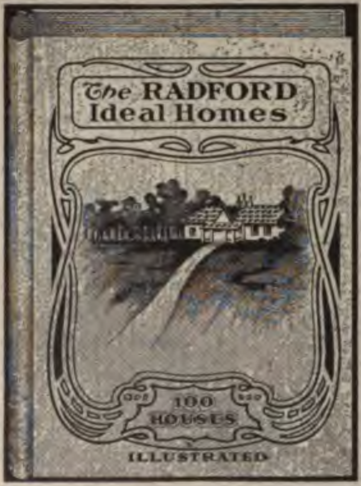

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